

MODEL (1)

First: Choose the correct answer from the given :

- 1 The point $(-3, 4)$ lies in quadrant:
 A first B second C third D fourth
- 2 The positive square root of mean of the squares of deviations of values from its arithmetic mean is called.
 A The range B the arithmetic mean
 C The standard deviation D the mode
- 3 If $3a = 4b$, then $a : b = \dots\dots\dots$
 A 3:4 B 4:3 C 3:7 D 4:7
- 4 If $n(x) = 2$, $n(y^2) = 9$, then $n(x \times y) = \dots\dots\dots$
 A 6 B 18 C 11 D 7
- 5 The range of the set of the values 7, 3, 6, 9 and 5 =
 A 3 B 4 C 6 D 12
- 6 If $y \propto x$ and $y = 2$ when $x = 8$, then $y = 3$ when $x = \dots\dots\dots$
 A 16 B 12 C 24 D 6

Second:

- A If $X \times Y = \{ (2, 2) , (2, 5) , (2, 7) \}$. Find

First: Y .

Second: $Y \times X$

- B If a, b, c and d are proportional **prove that:**

$$\frac{a}{b-a} = \frac{c}{d-c}$$

Third:

A If $X = \{2, 3, 5\}$, $Y = \{4, 6, 8, 10\}$ and R is a relation from X to Y where aRb means " $2a = b$ " for all $a \in X$, $b \in Y$.

First: Write R and represent it by an arrow diagram.

Second: Show that R is a function.

B Find the number that if we add to each terms of the ratio $7:11$ it becomes $2:3$.

Fourth:

A If $X = \{1, 3, 5\}$ and R is a relation on X , where $R = \{(a, 3), (b, 1), (1, 5)\}$. **Find:**

First: The range of the relation.

Second: The value of $a + b$.

B If $Y \propto \frac{1}{x}$ and $y = 3$ when $x = 2$. **Find:**

First: The relation between x , y .

Second: The value of y when $x = 1.5$.

Fifth:

A Represent graphically the function $f(x) = (x-3)^2$, $X \in [0, 6]$ from the graph deduce the vertex of the curve, minimum value of the function, equation of the axis of symmetry.

B Calculate the arithmetic mean and the standard deviation of the set of values 8, 9, 7, 6 and 5.

ANSWER MODEL (1)

QUESTION (1)

- (1) Second
- (2) The standard deviation
- (3) $3a = 4b \Rightarrow a : b = 4 : 3$
- (4) $n(x \times y) = n(x) \times n(y) = 2 \times 3 = 6$
- (5) The range = max – mini = $9 - 3 = 6$
- (6) $\frac{2}{3} = \frac{8}{x} \Rightarrow x = \frac{8 \times 3}{2} = 12$

QUESTION (2)

(a) $Y = \{ 2, 5, 7 \}, X = \{ 2 \}$

$$Y \times X = \{ 2, 5, 7 \} \times \{ 2 \}$$

$$= \{ (2, 2), (5, 2), (7, 2) \}$$

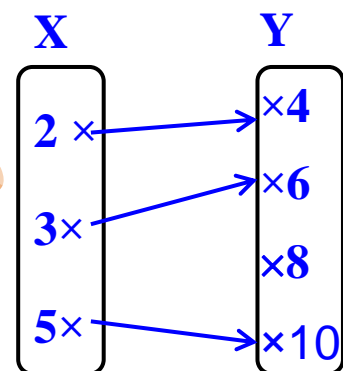
(b) $\frac{a}{b} = \frac{c}{d} = m \Rightarrow a = m c, b = m d$

$$\frac{a}{b - a} = \frac{mc}{md - mc} = \frac{\cancel{mc}}{\cancel{m}(d - c)} = \frac{c}{(d - c)}$$

QUESTION (3)

(a) $R = \{(2,4), (3,6), (5,10)\}$

R is a Function because each element of the set X appears only once as a first projection in one of the ordered pairs of the relation



(b) Let the number = x

$$\frac{X+7}{X+11} = \frac{2}{3} \Rightarrow 3(x+7) = 2(x+11)$$

$$3x + 21 = 2x + 22 \Rightarrow 3x - 2x = 22 - 21$$

$$\therefore x = 1 \quad \therefore \text{the number is } 1$$

QUESTION (4)

(a) The range = $\{3, 1, 5\}$

\therefore R is a relation (function) on X

$$\therefore a = 3 \text{ or } 5 \quad \text{and} \quad b = 5 \text{ or } 3$$

$$a + b = 3 + 5 \text{ or } 5 + 3 = 8$$

(b) $Y \propto \frac{1}{x} \Rightarrow Y = \frac{m}{x} \Rightarrow m = yx = 3 \times 2 = 6$

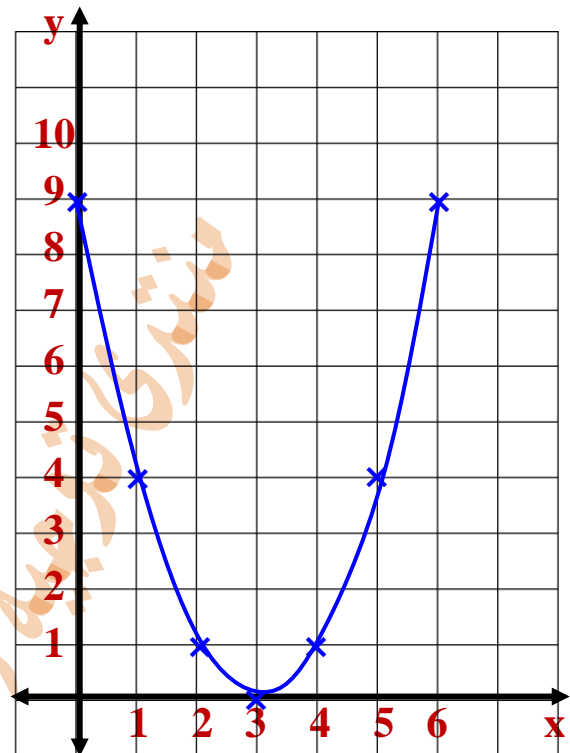
The relation $Y = \frac{6}{x}$

When $x = 1,5 \quad \therefore y = \frac{6}{1,5} = 4$

QUESTION (5)

(a)

X	$Y = (x - 3)^2$	y
0	$Y = (0 - 3)^2$	9
1	$Y = (1 - 3)^2$	4
2	$Y = (2 - 3)^2$	1
3	$Y = (3 - 3)^2$	0
4	$Y = (4 - 3)^2$	1
5	$Y = (5 - 3)^2$	4
6	$Y = (6 - 3)^2$	9



The vertex of the curve (3 , 0)

The equation of symmetrical axis: $x = 3$

The minimum value = 0

$$(b) \quad x\backslash = \frac{9 + 8 + 7 + 6 + 5}{5} = 7$$

x	$x - x\backslash$	$(x - x\backslash)^2$
8	$8 - 7 = 1$	1
9	$9 - 7 = 2$	4
7	$7 - 7 = 0$	0
6	$6 - 7 = -1$	1
5	$5 - 7 = -2$	4
total		10

$$\sigma = \sqrt{\frac{\sum (x - x\backslash)^2}{n}} = \sqrt{\frac{10}{5}} = \sqrt{2}$$

MODEL (2)

First: Choose the correct answer from the given :

- 1 The point (3, 4) lies in quadrant:
 A first B second C third D fourth
- 2 is one of the measures of the dispersions.
 A The median B The arithmetic mean
 C The standard deviation D The mode
- 3 The third proportion of the two numbers 3 and 6 is
 A $\frac{1}{2}$ B 9 C 2 D 12
- 4 If $n(x) = 2$, $n(y \times x) = 6$, then $n(y^2) = \dots\dots\dots$
 A 4 B 9 C 16 D 12
- 5 The range of the set of the values 7, 3, 6, 9 and 5 =
 A 3 B 4 C 6 D 12
- 6 If $xy = 7$, then $y \propto \dots\dots\dots$
 A $\frac{1}{x}$ B $x - 7$ C x D $x + 7$

Second:

- A If $x = \{2, 5\}$, $Y = \{1, 2\}$, $Z = \{3\}$. Find:

First: $n(X \times Z)$.

Second: $(Y \cap X) \times Z$.

- B If b is a middle proportional between a and c prove that:

$$\frac{a-b}{a-c} = \frac{b}{b+c}$$

Third:

- A If $X = \{1, 3, 4, 5\}$, $Y = \{1, 2, 3, 4, 5, 6\}$ and R is a relation from X to Y where $a R b$ means $a + b = 7$ For all $a \in X$, $b \in Y$.

First: Write R and represent it by an arrow diagram.

Second: Show that R is a function.

- B If $5a = 3b$. Find the value of: $\frac{7a + 9b}{4a + 2b}$

Fourth:

- A If $f(x) = 4x + b$ and $f(3) = 15$ find the value of b .

- B If $Y \propto X$, $y = 6$ when $x = 3$. **Find:**

First: The relation between X , Y .

Second: The value of y when $X = 5$.

Fifth:

- A Represent graphically the function $f(x) = 4 - X^2$, $X \in [-3, 3]$ from the graph deduce the vertex of the curve, maximum value of the function, equation of the axis of symmetry.

- B The following frequency distribution shows the number of children of some families in a new city:

Number of children	0	1	2	3	4	sum
Number of families	6	15	40	25	14	100

Calculate the mean and the standard deviation to the number of children.

ANSWER MODEL (1)

QUESTION (1)

(1) First

(2) The standard deviation

$$(3) \frac{(6)^2}{3} = \frac{36}{3} = 12$$

$$(4) n(y) = \frac{6}{2} = 3 \Rightarrow n(y)^2 = (3)^2 = 9$$

$$(5) \text{ The range} = \text{max} - \text{mini} = 9 - 3 = 6$$

$$(6) y \propto \frac{1}{x}$$

QUESTION (2)

$$(a) n(x \times z) = n(x) \times n(z) = 2 \times 1 = 2$$

$$(y \cap x) \times z = \{2\} \times \{3\} = \{(2, 3)\}$$

$$(b) \frac{a}{b} = \frac{b}{c} = m \quad b = c m \quad , \quad a = c m^2$$

$$\frac{a - b}{a - c} = \frac{cm^2 - cm}{cm^2 - c} = \frac{\cancel{mc} (m - 1)}{\cancel{c} (m - 1) (m - 1)} = \frac{m}{(m - 1)}$$

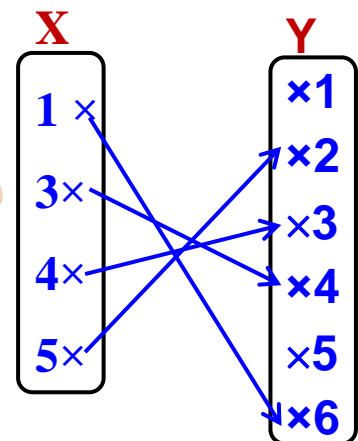
$$\frac{b}{b - c} = \frac{cm}{cm - c} = \frac{\cancel{mc}}{\cancel{c} (m - 1)} = \frac{m}{(m - 1)}$$

$$\therefore \frac{a - b}{a - c} = \frac{b}{b - c}$$

QUESTION (3)

(a) $R = \{(1, 6), (3, 4), (4, 3), (5, 2)\}$

R is a Function because each element of the set X appears only once as a first projection in one of the ordered pairs of the relation



(b) $5a = 3b \Rightarrow \frac{a}{b} = \frac{3}{5} = m \Rightarrow a = 3m, b = 5m$

$$\frac{7a + 9b}{4a + 2b} = \frac{7 \times 3m + 9 \times 5m}{4 \times 3m + 2 \times 5m} = \frac{21m + 45m}{12m + 10m} = \frac{66m}{22m} = 3$$

QUESTION (4)

(a) $F(x) = 4x + b$

$F(3) = 4 \times 3 + b = 15 \Rightarrow b = 15 - 12 = 3$

(b) $Y \propto x \Rightarrow Y = mx \Rightarrow 6 = 3 \times m$

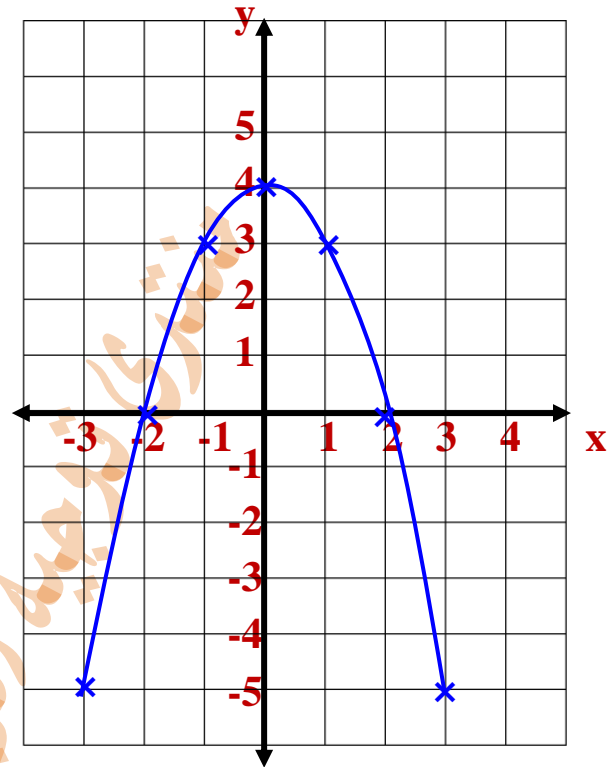
$\therefore m = 2 \Rightarrow \text{The relation } Y = 2x$

When $x = 5 \quad \therefore y = 2 \times 5 = 10$

QUESTION (5)

(a)

X	$Y = 4 - x^2$	y
-3	$Y = 4 - (-3)^2$	-5
-2	$Y = 4 - (-2)^2$	0
-1	$Y = 4 - (-1)^2$	3
0	$Y = 4 - (0)^2$	4
1	$Y = 4 - (1)^2$	3
2	$Y = 4 - (2)^2$	0
3	$Y = 4 - (3)^2$	-5



The vertex of the curve (0 , 4)

The equation of symmetrical axis: $x = 0$

The maximum value = 4

(b)

x	K	$X \times k$	$x - x\backslash$	$(x - x\backslash)^2$	$k. (x - x\backslash)^2$
0	6	0	$0 - 2,26 = - 2,26$	5,1076	30,6456
1	15	15	$1 - 2,26 = - 1,26$	1,5876	23,814
2	40	80	$2 - 2,26 = - 0,26$	0,0676	2,704
3	25	75	$3 - 2,26 = 0,74$	0,5476	13,69
4	14	56	$4 - 2,26 = 1,74$	3,0276	42,3864
total	100	226			113,24

$$x\backslash = \frac{\sum (x \cdot k)}{\sum k} = \frac{226}{100} = 2,26$$

$$\sigma = \sqrt{\frac{k \cdot \sum (x - x\backslash)^2}{\sum k}} = \sqrt{\frac{113,24}{100}} = 1,06$$

MODEL (3)

لطلاب الدمج الإجابة في نفس الورقة

First: Complete:

(For the special needs)

- 1 The point (5, 3) lies in quadrant first
- 2 $n(x) = X^3 + 8$ is called a polynomail of degree thert
- 3 The range of the set of the values 4, 14, 25, and 34 is $34 - 4 = 29$
- 4 If $y = 2x$, then $y \propto$ $y \propto x$
- 5 If $X = \{2, 4, 6\}$, then $n(x^2) =$ $n(x) = 3 \Rightarrow n(x^2) = 9$
- 6 If $(a, 3) = (6, b)$, then $a + b =$ $6 + 3 = 9$

Second: Choose the correct answer:

- 1 If $xy = 7$, then $y \propto$

A $\frac{1}{x}$	B $x - 7$	C x	D $x + 7$
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- 2 If 2, 3, 6 and X are proportional, then $x =$

A 9	B 18	C 12	D 3
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- 3 If $2a = 5b$, then $\frac{a}{b} =$

A $\frac{-5}{2}$	B $\frac{-2}{5}$	C $\frac{2}{5}$	D $\frac{5}{2}$
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- 4 is one of the measures of the dispersions

A the arithmetic mean	B The range
C the mode	D The median

5 If $n(x) = 5$, $n(x \times Y) = 10$, then $n(Y) = \dots\dots\dots$

A 4

B 3

C 2

D 1

6 If $x = \{1\}$, then $x^2 = \dots\dots\dots$

A 1

B (1,1)

C $\{(1,1)\}$

D $\{1\}$

Third: Put (✓) or (X):

1 If the relation of $f = \{(1, 3), (2, 4), (3, 3)\}$, then the domain of the function $\{1, 2, 3\}$ (✓)

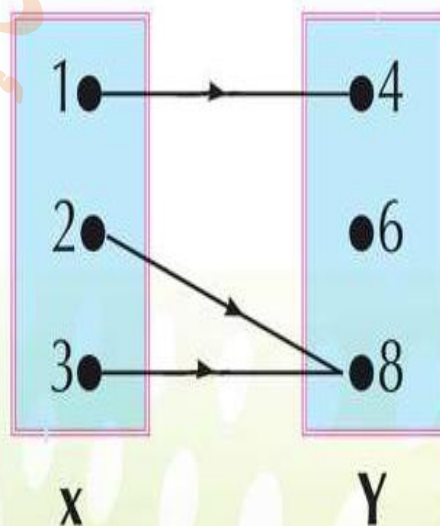
2 If $y \propto x$ and $y = 6$ when $x = 3$, then $y = 2$ when $x = 4$ (X)

3 If $\sum (x - \bar{x})^2 = 36$ for a set of values whose number equals 9, then $\sigma 4$ (X)

4 The intersection point of the straight line $f(x) = x + 2$ with x-axis is the point $(-2, 0)$ (✓)

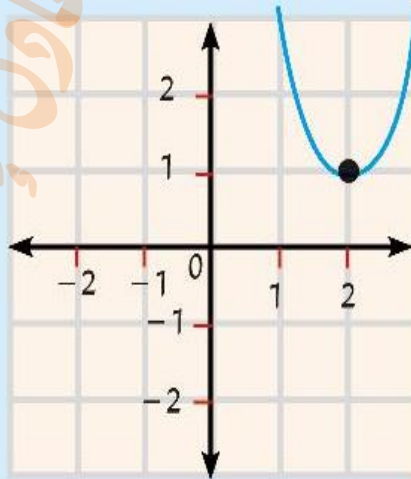
5 If $f: x \longrightarrow Y$ then x is called the domain of this function (✓)

6 The arrow diagram from X to Y is a function (✓)



Fourth: join from Column (A) to Column (B):

A	B
1 If $(1, 4) \in \{2, x\} \times \{1, 4\}$ Then $X = \dots\dots\dots$ <u>1</u>	• 6
2 If The Function f Which $f(X) = X - 4$ is represented graphically By a Straight Line Passes through the Point $(a, 2)$ Then $A = \dots\dots\dots$ <u>6</u>	• 1
3 $\frac{1}{2} = \frac{3}{6} = \frac{4}{8} = \frac{\dots}{16}$ <u>8</u>	• 10
4 If $f(x) = 5$, then $f(5) + f(-5) = \dots\dots\dots$ <u>10</u>	• ± 6
5 The third proportional of the two numbers 4 and 9 is $\dots\dots\dots$ <u>± 6</u>	• 2
6 In the opposite figure the equation of the little of symmetry is $x = \dots\dots\dots$ <u>2</u>	• 8



ALGEBRA – MODEL No**1****Q1) A) Choose the correct answer:**

(1) The third proportion between 3 , 6 is

- a) $\frac{1}{2}$ b) 2 c) 9 d) 12

(2) If $Y = 4X$, then.....

- a) $Y \propto \frac{1}{x}$ b) $X \propto \frac{1}{y}$ c) $Y \propto X$ d) Other wise

(3) $\mathcal{F}(x) = X(3X + 2)^2$ is a function of Degree

- a) First b) Second c) Third d) fourth

B): If $X = \{1, 3, 5\}$, $Y = \{4, 5\}$, Find $(X \cap Y) \times (X \cup Y)$ **Q2) A) Choose the correct answer:**(1) If $X = \{7\}$, $Y = \{5\}$, then $n(X \times Y) = \dots\dots\dots$

- a) Zero b) 1 c) 2 d) 35

(2) The difference between the greatest value and the smallest value of a set of data is

- a) The mean b) The range c) The median d) The mode

(3) The arithmetic mean for the values 7 , 3 , 6 , 9 , 5 equal

- a) 3 b) 4 c) 6 d) 12

B): If B is a middle proportion between A , C, prove that:

$$\frac{A^2 + B^2}{B^2 + C^2} = \frac{A}{C}$$

Q3

A) If $X = \{ 1, 2, 4 \}$, $Y = \{ 4, 5, 2, 7 \}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a + b = 6$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Prove that R is a function and write its range
-

B) If $\frac{X}{2} = \frac{Y}{3} = \frac{Y-X}{5k}$, find the value of k ?

Q4

A) If $Y \propto \frac{1}{X}$ and $Y = 8$ when $X = 3$. Find the relation between Y and X then find value of Y when $X = 4$.

B) Find the standard deviation for the values 12, 13, 16, 18, 21

Q5

A) If the straight line which represents $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = 6x + K$ cut Y -axis at point $(m, 3)$, find the value of m, K .

B) Graph the function $\mathcal{F}(x) = (x - 2)^2$ where $x \in [-1, 5]$ and from graph find:

- ① The coordinates of vertex
- ② The maximum value of function
- ③ The equation of the axis of symmetry

— ◆ ◆ —

End of the questions

ALGEBRA – MODEL No 2**Q1) A) Choose the correct answer:**

(1) Which of the following from the dispersion measurement?

- a) Median b) Mean c) Range d) Mode

(2) If $X \propto Y$, $X = \dots\dots\dots$, where $m \neq 0$

- a) $m + Y$ b) $\frac{m}{y}$ c) $\frac{1}{m y}$ d) $m \times y$

(3) For any two sets A , B, the set $\{ (x,y) : x \in A , y \in B \}$ represents

- a) $n (A \times B)$ b) $A \times B$ c) $n (B \times A)$ d) $B \times A$

B): Find the arithmetic mean and the standard deviation for the set of values: 7 , 12 , 6 , 15 , 10

Q2) A) Choose the correct answer:

(1) Which value of a make the range of the set of the following values **53 , a , 85 , 57 , 60 , 55** equal **9** :

- a) 63 b) 61 c) 51 d) 50

(2) If $3 , x , \frac{1}{y}$, are proportional quantities, then $\dots\dots\dots = 3$

- a) $X^2 Y$ b) Y c) $X Y$ d) $\frac{x^2}{y}$

(3) If $\mathcal{F}(x) = n X^2 + 2 X^n - 3$, then the possible value of n which make $\mathcal{F}(x)$ if function of second degree is $\dots\dots\dots$

- a) $\{2, 3\}$ b) $\{1, -1\}$ c) $\{2, 1, 0\}$ d) $\{2, 1\}$

B): If $Y \propto \frac{1}{x}$, and $Y = 6$ when $X = 2$, find the value of X when $Y = \frac{3}{4}$

Q3

A) If $\frac{x}{5} = \frac{y}{3} = \frac{z}{6}$, prove that: $\frac{2x + y - z}{7} = \frac{y+z}{9}$

B) If $X = \{1, 4, 7\}$, $Y = \{-1, 1, 4, 7\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a + |b| = 6$ " for $a \in X, b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason.
-

Q4

A) If a, b, c, d are in continued proportion,

Prove That: $\frac{c^2 + a}{b} = \frac{d^2 + c}{d}$

B) Graph the function $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}, \mathcal{F}(x) = 2x - 4$

- ① From the graph find the intersection points with X-axis and Y-axis
 - ② If: $\mathcal{F}(a) = 20$, find the value of a
-

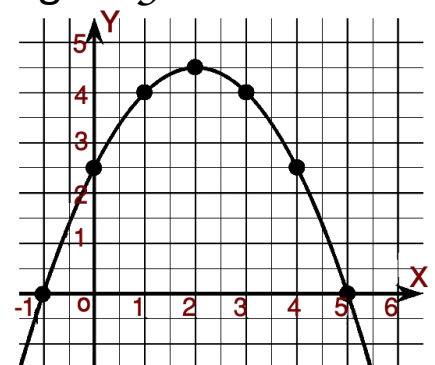
Q5

- The curve represents a function of second degree \mathcal{F} :

- ① Write the domain of \mathcal{F}

Use the graph to find:

- ② The range of the function \mathcal{F}
- ③ The equation of the line of symmetry
- ④ The maximum value of \mathcal{F}
- ⑤ The value of $\mathcal{F}(1)$
- ⑥ If $\mathcal{F}(x) = a(x - 2)^2 + K$, then find the numerical value of $a + k$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No 3**3****Q1) A) Choose the correct answer:**

(1) The difference between the greatest and smallest value is

- a) Median b) Mean c) Range d) Mode

(2) If $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = 3$, then $\frac{\mathcal{F}(6)}{\mathcal{F}(0)} = \dots\dots\dots$

- a) 6 b) 1 c) 3 d) Undefined

(3) Which of the following represents inverse variation?

- a) $Y = X$ b) $Y = X^2$ c) $XY^2 = 1$ d) $Y = \frac{3}{y}$

B): If $X = \{2, 3\}$, $Y = \{3, 4\}$, $Z = \{4, 5\}$, find:

① $Z \times (X \cap Y)$

② $(Z - Y) \times X$

Q2) A) Choose the correct answer:(1) If the point $(X + 1, X - 3)$ lies on X-axis, then $X =$

- a) -1 b) Zero c) -2 d) 3

(2) If $A(a, 4)$ satisfies the function $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = 2X + b$, then $6a + 3b = \dots\dots\dots$

- a) 12 b) 9 c) 6 d) 3

(3) If $X \times Y = \{(1,2), (1,3), (1,4)\}$, then $n(X) + 2(Y^2) = \dots\dots\dots$

- a) 3 b) 4 c) 6 d) 10

B): If $X, 2, 4, 2Y$ are in continued proportion.
Find the value of $X + Y$

Q3

A) If $X = \{-2, -1, 0, 1\}$, $Y = \{-1, 0, 1, 2, 4\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $b = a^2$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
- ② Is \mathcal{R} function or not? Give reason.

B) The following values for five students in exam: **8, 9, 6, 12, 10**
Find: ① The arithmetic mean ② The standard deviation

Q4

A) Graph the function $\mathcal{F}(x) = x(x - 2) - 3$ where $x \in [-2, 4]$ and from graph find:

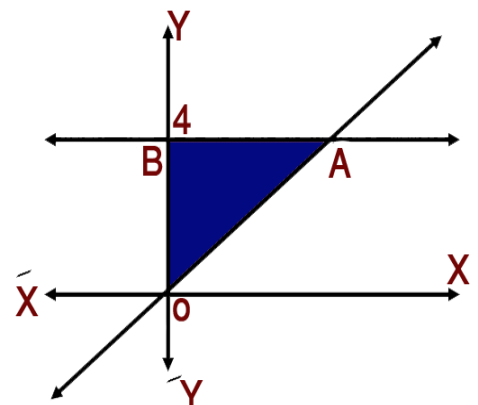
- ① The coordinates of vertex
- ② The maximum or minimum value of function
- ③ The equation of the axis of symmetry

B) If $\frac{a+b}{5} = \frac{b+c}{3} = \frac{c+a}{6}$, prove that: $\frac{a+b+c}{a-c} = \frac{7}{2}$

Q5

A) If $Y = 2 + b$, where $b \propto X$ and $X = 1$ when $Y = 5$, find the relation between X , Y then find the value of Y when $X = 2$

B) The opposite figure shows the \overrightarrow{AB} which represents the function $\mathcal{F}(x) = 4$, if \overrightarrow{OA} represents the linear function $G(x) = nx + k$ and the area of the triangle ABO equals 4 square units, then find the value of n , k where O is the origin point.



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**4****Q1) A) Choose the correct answer:**

(1) If $X = \{ 1, 3, 5 \}$, R is function on X , $R = \{ (a,3), (b,1), (1,5) \}$
then $a + b = \dots\dots\dots$

- a) 4 b) 6 c) 8 d) 2

(2) If $(L - 3, 2)$ lies in first quadrant, then L may be equals

- a) -3 b) 2 c) 7 d) Zero

(3) If $2a = 3b$, then $\frac{3a}{2b} = \dots\dots\dots$

- a) $\frac{3}{2}$ b) $\frac{2}{3}$ c) $\frac{9}{4}$ d) $\frac{4}{9}$

B): If $X^2 Y^2 - 4XY = -4$, prove that X is varies inverse with Y .

Q2) A) Choose the correct answer:

(1) The simplest dispersion measurement is

- a) Mean b) Median c) Standard deviation d) range

(2) If $(a, 2) \in$ Straight line $Y = 3X - 4$, then $a = \dots\dots\dots$

- a) 2 b) 3 c) 4 d) 7

(3) If $n(x) = 2$, $n(X \times Y) = 8$, then $n(Y^2) = \dots\dots\dots$

- a) 4 b) 2 c) 16 d) 8

B): Find the number which if it added to the two terms of the ratio **7:11** it will be **2 : 3**.

Q3

A) Find the standard deviation for the values: 2 , 5 , 6 , 8 , 9

B) The straight line which represents $\mathcal{F} : \mathcal{R} \rightarrow \mathcal{R}$ where $\mathcal{F}(x) = 3x + a$ cut Y-axis at the point (b , 7). **Find** the value of $2a - 5b$

Q4

A) If $\frac{a}{4} = \frac{b}{5} = \frac{c}{3}$, **prove that:** $\frac{a-b+c}{a+b-c} = \frac{1}{3}$

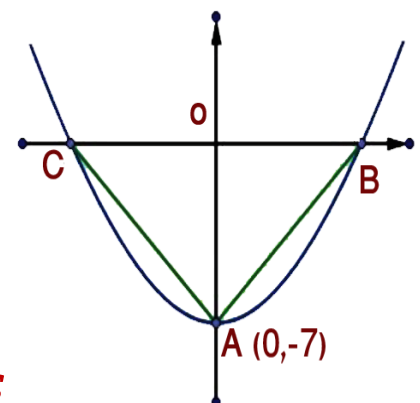
B) If $X = \{ 1 , 2 \}$, $Y = \{ 0 , 2 , 3 \}$ and \mathcal{R} is a relation form X to Y where **a \mathcal{R} b** means "**a + b is odd number**" for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason.
-

Q5

A) If $(3 - x, Y + 2) = (-4, 4)$, **Find** the value of $\sqrt{x + y}$

B) The opposite figure represents the curve of the function $\mathcal{F} : \mathcal{F}(x) = Lx^2 - 7$, the area of the $\triangle ABC = 21$ square units, **A (0 , -7)**. **Find** the coordinate of the point B, and then **find** the value of L.



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**5****Q1) A) Choose the correct answer:**

(1) If $5X = 9Y$, then $\frac{3x}{2y} = \dots\dots\dots$

- a) $27 : 10$ b) $9 : 5$ c) $5 : 9$ d) $81 : 25$

(2) The opposite figure represents a curve of quadratic function, if point A $(-4, 0)$, then the equation of line of symmetry is $X = \dots\dots$

- a) 1 b) -1 c) -2 d) Zero

(3) The number that it is added to each of the numbers **1, 3, 6** it becomes proportional is $\dots\dots\dots$

- a) 4 b) 3 c) 2 d) 1

B): If B is mean proportional between A, C.

Prove that: $\frac{a^2}{b^2} + \frac{b^2}{c^2} = \frac{2a}{c}$

Q2) A) Choose the correct answer:

(1) If $\mathcal{F}(X + 3) = X - 3$, then $\mathcal{F}(7) = \dots\dots\dots$

- a) 4 b) 1 c) 7 d) 10

(2) If $\sum (X - \bar{X})^2 = 36$ for nine of the values, then the standard deviation equals $\dots\dots\dots$

- a) 2 b) 18 c) 27 d) 4

(3) If $\mathcal{F}(x) = 3$, then $\mathcal{F}(2) - \mathcal{F}(7) = \dots\dots\dots$

- a) 5 b) -5 c) Zero d) -4

B): If $X = \{4, 5, 7\}$ and \mathcal{R} is function on X and $\mathcal{R} = \{(a, 5), (b, 5), (4, 7)\}$

① Find the numerical value of **$3a + 2b$**

② The range of the function

Q3

A) If $\frac{a}{4x+y} = \frac{b}{x-4y}$, prove that: $\frac{a+b}{5x-3y} = \frac{a-b}{3x+5y}$

B) Find the standard deviation for the values: 12 , 13 ,16 , 18 , 21

Q4

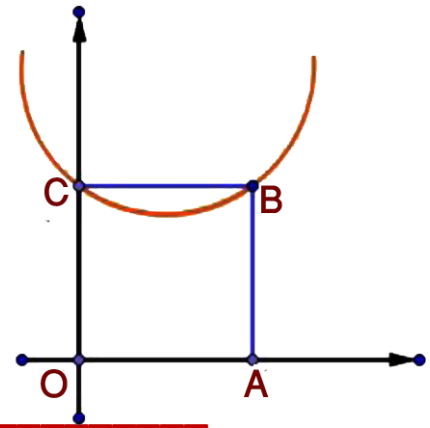
A) The opposite figure:

Represents the quadratic function

$$f: f(x) = x^2 - (K-2)x - K + 4$$

If ABCO is a square

Find the value of K



B) If $Y = 1 + b$ where b varies inverse with square of X , and $X = 1$ where $Y = 5$. **Find** the relation between X , Y then **find** the value of Y when $X = 2$

Q5

A) If $f(x) = a + x^2$, $g(x) = c$ are two polynomial function where a, c are two constant and $3f(2) + 3g(x) = 6$, **find** the numerical value of $2f(0) + 2g(7)$

B) If $X = \{3, 5, 7\}$, $Y = \{x : x \in \mathbb{N}, 10 < x < 30\}$ and the function f from $X \rightarrow Y$ where $f = \{(3,9), (5,15), (7,21)\}$

Find: ① The domain of f ② Write the rule of f

◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No

6

Q1 A) Choose the correct answer:

(1) If the point $(X-3, 2-X)$ lies in fourth quadrant, then $X = \dots\dots$

- a) 4 b) 3 c) 2 d) 1

(2) If $\mathcal{F}(x) = KX + 8$, $\mathcal{F}(2) = \text{zero}$, then $K = \dots\dots\dots$

- a) 8 b) 6 c) 4 d) -4

(3) If $a, 2, 4, b$ are in continued proportion, then $a + b = \dots\dots\dots$

- a) 2 b) 4 c) 6 d) 9

B): If b is mean proportion between a, c

Prove that: $\frac{2c^2 - 3b^2}{2b^2 - 3a^2} = \frac{c}{a}$

Q2 A) Choose the correct answer:

(1) If $Y \propto X$, $Y \propto \frac{1}{Z}$, then $Y \propto \dots\dots\dots$

- a) XZ b) $\frac{Z}{X}$ c) $\frac{X}{Z}$ d) X^2Z

(2) The standard deviation of the values $5, 5, 5, 5$ is

- a) Zero b) 5 c) 6 d) 2

(3) The function $F(x) = X^2 - (X-3)^2$ of degree

- a) Zero b) First c) Second d) Third

B): The point $(-1, 2)$ is the vertex of the curve $\mathcal{F}(x) = aX^2 - 6x + c$.
find the value of C

Q3

A) If $3a = 4b = 6c$, find $a : b : c$ then find the numerical value of the expression $\frac{3a+2b}{a+4c}$

B) If $X = \{-2, -1, 0, 1, 2\}$, and \mathcal{R} is a relation on X where $a \mathcal{R} b$ means "**a is additive invers of b**" for $a, b \in X$:

① Write \mathcal{R} and represents it by arrow diagram

② Is \mathcal{R} function or not? Give reason.

Q4

A) If $X = Z + 8$, Z varies inverse with Y and $Z = 2$ when $Y = 3$. **Find** the relation between X, Y then **find** the value of Y when $X = 3$

B) If $\mathcal{F}(x) = 2x + 5$, $\mathcal{G}(x) = x - 6$. **Prove that** $\mathcal{F}(2) + 3\mathcal{G}(3) = 0$

Q5

A) Find the arithmetic mean and standard deviation for the values **5, 7, 8, 9, 6**

B) If $(X - 2, 2^{y-1}) = (3, 1)$, find the value of X, Y

◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No 7**7****Q1) A) Choose the correct answer:**

(1) The range of the values 7 , 3 , 6 , 9 , 5 equals

- a) 3 b) 4 c) 6 d) 12

(2) $a : b = a^2 : \dots$, $a \neq b \neq \text{zero}$

- a)
- b^2
- b)
- $a b$
- c)
- $a^2 b$
- d)
- $a b^2$

(3) If $X = [0,5]$, $Y = [-3,2[$, then $(-2,4) \in \dots$

- a)
- X^2
- b)
- Y^2
- c)
- $X \times Y$
- d)
- $Y \times X$

B): If b is mean proportion between a , cProve that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$ **Q2) A) Choose the correct answer:**

(1) The relation represents inverse variation between Y , X is

- a)
- $Y = 5 X$
- b)
- $\frac{x}{5} = \frac{4}{y}$
- c)
- $\frac{x}{5} = \frac{y}{3}$
- d)
- $Y = X + 3$

(2) If $X = \{1,2,3\}$, $R = \{ (a , b) : a \in X , b \in Y \}$ then number of elements in R equals

- a) 12 b) 9 c) 6 d) 3

(3) If the curve of the function $\mathcal{F} : \mathcal{F} (x) = x^2 + b x - 3$ cut form negative part of X-axis only one units, then **b** =

- a) b) c) d)

B): If $(\sqrt{x-1} , 11) = (4 , Y + 3)$, find the value of $\sqrt{x+y}$

Q3

A) If $\mathcal{F}: \mathcal{F}(x) = X^2 + bX + c$, and $F(2) = 2$ when $X \in \{0, 3\}$. **Find** the value of b, c .

B) Find the standard deviation for the values **5, 7, 8, 14, 16**

Q4

A) If $X = \{-1, 0, 1\}$, and \mathcal{R} is a relation on X where **a \mathcal{R} b** means " **$b = a^2$** " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? If R is a function, find its range.
-

B) If $\frac{x}{3} = \frac{y}{4} = \frac{z}{5}$, **prove that:** $\frac{2y-z}{3x-2y+z} = \frac{1}{2}$

Q5

A) If $\mathcal{F}: \mathcal{F}(x) = aX^2 + 5X + 7$, if linear function, **find** the value of a then find $\mathcal{F}(-1)$.

B) If the weight of a body on the moon (**W**) is directly proportional with its weight on the ground (**R**), if the body weight **84 kg**, on the ground and its weight on the moon is **14 kg**. What will its weight be on the moon if its weight on the ground **144 kg**?

◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**8****Q1) A) Choose the correct answer:**(1) If $X = \{12\}$, then $n(X^2) = \dots\dots\dots$

- a) 1 b) 2 c) 4 d) 144

(2) If $(a, a) \in \mathcal{F}$, $\mathcal{F}(x) = 2x - 3$, then $a = \dots\dots\dots$

- a) Zero b) 1 c) 2 d) 3

(3) If the range of the values 7, 3, 6, K, 5 is 6, then $K = \dots\dots\dots$

- a) 3 b) 6 c) 9 d) 12

B): If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{6, 5\}$, find :

① $X \times (Y \cap Z)$

② $(X - Y) \times Z$

Q2) A) Choose the correct answer:(1) If $X = [-2, 2[$, $Y = [0, 4]$, then $(-2, -1) \in \dots\dots\dots$

- a) X^2 b) Y^2 c) $X \times Y$ d) $Y \times X$

(2) If the quantities 5a, 2, 3b, 7 are proportional, then $\frac{a}{b} = \dots\dots\dots$

- a) $\frac{3}{7}$ b) $\frac{6}{35}$ c) $\frac{3}{5}$ d) $\frac{3}{2}$

(3) If $Y - X = \frac{1}{x} - \frac{1}{y}$, where $X \neq Y$ zero, then $\dots\dots\dots$

- a) $Y \propto \frac{1}{x}$ b) $Y \propto \frac{1}{x^2}$ c) $Y \propto X$ d) $Y \propto X + 1$

B): If a, b, c, d are in continued proportion, prove that:

$$\Rightarrow \frac{a^2 - 3c^2}{b^2 - 3d^2} = \frac{b}{d}$$

Q3

A) If $X = \{-1, 1, 2, \frac{1}{2}\}$ and R is relation on X where $a \mathcal{R} b$ means " $b = a^{-1}$ " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? If R is a function, find its range.
-

B) Find the standard deviation for the values 5, 7, 8, 9, 6

Q4

A) If the value of speed (V) that water passes through a hose nuzzle inversely changes with the square of the hose radius length (r), and $V = 5$ cm/s when $r = 3$ cm. find V when $r = 2.5$ cm

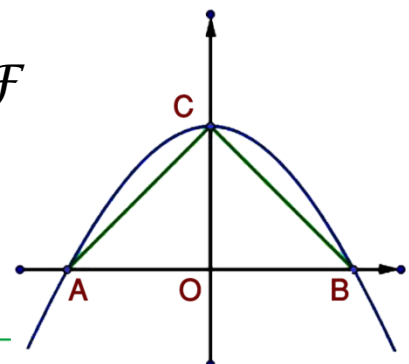
B) If $\mathcal{F}(x) = aX + b$, and $\mathcal{F}(a) = b$, find the numerical value of $ab^2 + 5$

Q5

A) If $\frac{a+b}{7} = \frac{b+c}{5} = \frac{c+a}{6}$, find $a : b : c$

B) The opposite figure represents function \mathcal{F}
Where $\mathcal{F}(x) = 5 - x^2$, **find**:

- ① The coordinates of points B, C
- ② Area of $\triangle ABC$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**9****Q1) A) Choose the correct answer:**(1) If $\{2\} \times \{x, y\} = \{(2, 4), (2, 3)\}$, then $X - Y = \dots\dots\dots$

- a) 1 b) -1 c) ± 1 d) Zero

(2) If $\mathcal{F}(x) = KX + 8$, $\mathcal{F}(2) = \text{zero}$, then $K = \dots\dots\dots$

- a) 8 b) 1 c) 3 d) -1

(3) If the standard deviation for some of values equals 2, and the number of these values is 2, then $\sum (x - \bar{x})^2 = \dots\dots\dots$

- a) 12 b) 18 c) 24 d) 36

B): If $\frac{a}{b-a} = \frac{c}{d-c}$,Prove that a, b, c, d are proportional quantities**Q2) A) Choose the correct answer:**(1) If $\frac{a}{3} = \frac{b}{2} = \frac{2a+b}{x}$, then $x = \dots\dots\dots$

- a) 8 b) 4 c) 3 d) 1

(2) If $3, X, \frac{1}{y}$ are in continued proportional, then $Y \propto \dots\dots\dots$

- a) X b) $\frac{1}{x}$ c) X^2 d) $\frac{1}{x^2}$

(3) The simplest dispersion measurement is $\dots\dots\dots$

- a) Range b) Median c) Mean d) Mode

B): Find the standard deviation for the values 6, 8, 10, 12, 14

Q3

A) If $X = \{ 1, 2, 3 \}$, $Y = \{ 1, 4, 9, 10 \}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a = \sqrt{b}$ " for $a \in X$, $b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
- ② Prove that \mathcal{R} is a function and write its range

B) If the curve of function $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$ where $\mathcal{F}(x) = m - x^2$ cut x-axis in the point $(-2, b)$, find the value of $F(x) = m^b + 2m$

Q4

A) Graph the function $\mathcal{F}(x) = (x - 2)^2$ where $x \in [0, 4]$ and from graph find:

- ① The equation of the axis of symmetry
- ② The maximum value of function

B) IF $Y = 5 + a$, $a \propto X$, find the relation between X , y where $a = 6$ when $X = 2$, then find X when $Y = 8$

Q5

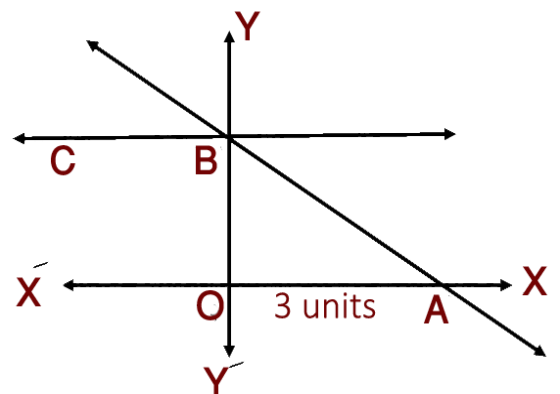
A) If A, b, C, D are in continued proportion, prove that:

$$\left(\frac{a+b}{b+c} \right)^3 = \frac{a}{d}$$

B) In the opposite figure:

The function \mathcal{F} represents by \overrightarrow{AB} ,
 $OA = 3$ units, the function $G: G(x) = 6$
 Represents by \overrightarrow{BC} .

- ① Find the rule of \mathcal{F}
- ② The value of $\mathcal{F}(6) + G(1)$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**10****Q1) A) Choose the correct answer:**

(1) The range for the values 5 , 14 , 4 , 37 , 15 , 16 , 7 is

- a) 33 b) 32 c) 30 d) 22

(2) If $X = \{ 3 , 1 , 5 \}$ and \mathcal{R} is function on X where $\mathcal{R} = \{ (a,3) , (b,1) , (1,5) \}$, then the numerical value of $a + b = \dots$

- a) 4 b) 6 c) 8 d) 10

(3) If $b < 3$, then the point $(- 5 , b - 3)$ lies in quadrant

- a) First b) Second c) Third d) Fourth

B): If a , b , c , d are in continued proportion, prove that:

$$\Rightarrow \frac{a-d}{a+b+c} = \frac{a-2b+c}{a-b}$$

Q2) A) Choose the correct answer:(1) If $a , x , b , 2x$ are proportional, then $\frac{b}{a} = \dots\dots\dots$

- a)
- $\frac{3}{2}$
- b)
- $\frac{2}{3}$
- c) 3 d) 2

(2) The relation which represents direct variation between X , Y is ...

- a)
- $XY = 5$
- b)
- $\frac{x}{5} = \frac{y}{3}$
- c)
- $Y = X + 3$
- d)
- $\frac{x}{5} = \frac{4}{y}$

(3) If $\mathcal{F}(X - 4) = X + 3$, then $\mathcal{F}(3) = \dots\dots\dots$

- a) 5 b) 6 c) 10 d) 20

B): Find the arithmetic mean and the standard deviation for the values 7 , 12 , 6 , 15 , 10

Q3

A) If $X = \{-2, -1, 0, 1, 2\}$, $Y = \{4, 2, \frac{3}{2}, 1, \frac{1}{2}, \frac{1}{4}, \frac{1}{8}\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $b = 2^a$ " for $a \in X, b \in Y$:

- ① Write \mathcal{R} and represents it by arrow diagram
- ② Prove that R is a function and write its range

B) If $\frac{x+y}{7} = \frac{y+z}{5} = \frac{x+z}{8}$, prove that: $\frac{x+y+z}{x-z} = 5$

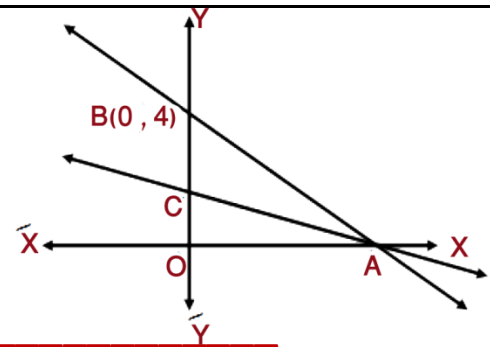
Q4

A) In the opposite figure:

\overrightarrow{AC} represents $\mathcal{F}(x) = 2 - \frac{2}{3}x$,

\overrightarrow{AB} represents $G(x) = Kx + m$

If $B(0, 4)$, find the value of k, m



B) If $2a = 3b = 4c$, find the value of $\frac{a^2 + b^2 + c^2}{a(b+c)}$

Q5

A) If $Y = Z + 5$, and Z varies inverse with X , $Y = 6$ when $X = 2$.

Find the relation between X, Y then Find value of Y at $X = 1$

B) In the opposite figure:

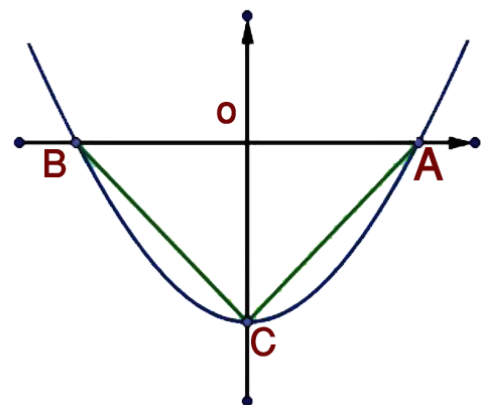
$\mathcal{F}: \mathcal{F}(x) = x^2 - K$, the triangle ABC

An equilateral triangle its area

Equals $9\sqrt{3}$ square units

Find: ① The value of K

② The coordinate of A, B



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**11****Q1) A) Choose the correct answer:**(1) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = 2$, then $\frac{a}{d} = \dots\dots$

- a) 5×2^2 b) 40 c) 10 d) 2×5^3

(2) If $\{2\} \times \{x, y\} = \{(2, 4), (2, 3)\}$, then $X - Y = \dots\dots\dots$

- a) 1 b) -1 c) ± 1 d) Zero

(3) If $(|x|, 4) = (3, Y^2)$, and the point (x, y) lies in the fourth quadrant, then $X + Y = \dots\dots\dots$

- a) 7 b) 1 c) -1 d) -7

B): Find the arithmetic mean and the standard deviation for the values 14, 15, 20, 22, 24

Q2) A) Choose the correct answer:(1) If $3a = 2b = 4c$, then $a : b : c = \dots\dots\dots$

- a) 3 : 4 : 6 b) 3 : 6 : 4 c) 4 : 6 : 3 d) 4 : 3 : 6

(2) The relation which represents direct variation between X, Y is ...

- a) $XY = 5$ b) $\frac{x}{5} = \frac{y}{3}$ c) $Y = X + 3$ d) $\frac{x}{5} = \frac{4}{y}$

(3) Selecting a sample of layers of statistical society is called sample

- a) Random b) Class (layer) c) Deliberate d) bunch

B): If $X - Y = \{7\}$, $Y - X = \{4, 2\}$, $X \cap Y = \{6\}$, find:

① $(X - Y) \times Y$

② $(Y - X) \times X$

Q3

A) If $\frac{x+y}{25} = \frac{x-y}{11} = \frac{x+y-z}{8}$, prove that: $X : Y : Z = 18 : 7 : 17$

B) If the set of function $\mathcal{F} = \{ (0, 5), (2, 3), (3, 2), (4, 1), (1, 4) \}$

① Find the domain and range of \mathcal{F}

② Write the rule of \mathcal{F}

Q4

A) If B is mean proportional between A , C.

Prove that: $\frac{2c^2 - 3b^2}{2b^2 - 3a^2} = \frac{c^2}{b^2} = \frac{c}{a}$

B) If $\mathcal{F} : \mathcal{R} \rightarrow \mathcal{R}$ where $\mathcal{F}(x) = (a - 3)X^2 + bX + 5$ of first degree, $\mathcal{F}(3) = 11$, find the value of a , b

Q5

A) IF $Y = a - 9$, $Y \propto \frac{1}{x^2}$, and $a = 18$ at $X = \frac{3}{2}$, find the relation between X , y then find Y when $X = 1$

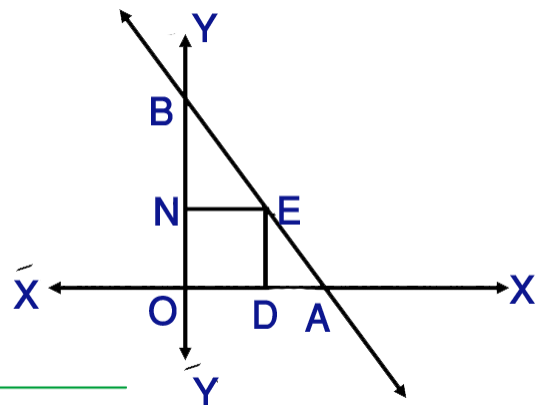
B) In the opposite figure:

\overrightarrow{AB} represent $\mathcal{F}(x) = KX + m$,

$A(3, 0)$, $B(0, 6)$, ODNE is square

Find: ① The rule of Function \mathcal{F}

② The area of Square ODEN



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No**12****Q1) A) Choose the correct answer:**

(1) If the range of the values 2 , 7 , a , 6 is 8, $a > 0$, then $a = \dots\dots\dots$

- a) 4 b) 9 c) - 1 d) 10

(2) If $Y = 3X - 6$, then $Y \propto \dots\dots\dots$

- a) X b) 3X c) X - 2 d) X - 6

(3) If the point $(K^2 - 4, K)$ lies on the negative part from Y-axis, then the value of $K = \dots\dots\dots$

- a) ± 2 b) 4 c) - 2 d) 2

B): Find the arithmetic mean and the standard deviation for the values 8 , 9 , 7 , 6 , 5

Q2) A) Choose the correct answer:

(1) The maximum value of $F(x) = -2x^2 + 4x + 3$ is $\dots\dots\dots$

- a) 5 b) 1 c) 3 d) - 1

(2) If a , 3 , 9 , b are in continued proportion, then $a + b = \dots\dots\dots$

- a) 12 b) 26 c) 27 d) 28

(3) If $X = \{3, 1, 5\}$ and \mathcal{R} is function on X where

$\mathcal{R} = \{(a,3), (b,1), (1,5)\}$, then the numerical value of $a + b = \dots\dots\dots$

- a) 4 b) 6 c) 8 d) 10

B): If $\frac{x+y}{5} = \frac{y+z}{3} = \frac{x+z}{6}$, prove that: $\frac{x-z}{x+y+z} = \frac{2}{7}$

Q3

A) If $X = \{ 1, 2, 4, 6, 10 \}$ and \mathcal{R} is relation on X where $a \mathcal{R} b$ means "**a is multiple of b**" for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason
-

B) If B is mean proportional between A, C .

Prove that: $\frac{a+b+c}{a^{-1}+b^{-1}+c^{-1}} = b^2$

Q4

A) If $\mathcal{F}(x) = 5x - b$, $\mathcal{G}(x) = x - 2b$, and $\mathcal{F}(1) + \mathcal{G}(3) = -7$,
Find $\mathcal{F}(3) + \mathcal{G}(1)$

B) If $Y = Z + 5$, $Z \propto \frac{1}{x}$, find the relation between X, y where $Y = 6$
when $X = 2$, then find Y when $X = 1$

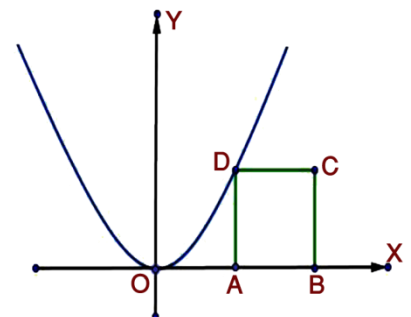
Q5

A) If $4a^2 + 9b^2 = 12ab$, prove that: a varies directly with b

B) In the opposite figure:

If $\mathcal{F}(x) = x^2$ and $ABCD$ is square

$B(6, 0)$, find the area of square $ABCD$



◆ ◆ ◆
End of the questions

ALGEBRA – MODEL No

13

Q1) A) Choose the correct answer:

(1) If the all the values are equals, then

- a) $X - \bar{X} > 0$ b) $X - \bar{X} < 0$ c) $\sigma = 0$ d) $\bar{X} = 0$

(2) If $\frac{y+3}{y} = \frac{x+2}{x}$, $x \neq y \neq 0$, then

- a) $Y \propto X$ b) $Y \propto \frac{1}{x}$ c) $Y \propto X + 2$ d) $Y \propto X + Y$

(3) If $(|x|, 4) = (3, Y^2)$, and the point (x, y) lies in the fourth quadrant, then $X + Y = \dots\dots\dots$

- a) 7 b) 1 c) -1 d) -7

B): Find the arithmetic mean and the standard deviation for the values 73, 54, 62, 71, 60

Q2) A) Choose the correct answer:

(1) The equation of line of symmetry $\mathcal{F}(x) = (X - 2)^2$ is

- a) $X = 0$ b) $X = 2$ c) $X = -2$ d) $X = -4$

(2) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = 2$, then $\frac{a}{d} = \dots\dots\dots$

- a) 5×2^2 b) 40 c) 10 d) 2×5^3

(3) If $F(x) = X^2$, $X \in [-2, 2]$, then $F(x) \in \dots\dots\dots$

- a) $[0, 4[$ b) $]0, 4[$ c) $[0, 4]$ d) $[-4, 4[$

B): If $\frac{y}{x-z} = \frac{x}{y} = \frac{x+y}{z}$, prove that each ratio equal 2 ($x + y \neq 0$)

Then find $X : Y : Z$: $\frac{2x + y - z}{7} = \frac{y+z}{9}$

Q3

A) If $X = \{1, 2, 3, 6, 11\}$ and \mathcal{R} is relation on X where $a \mathcal{R} b$ means " $a + 2b = \text{odd number}$ " for $a, b \in X$:

- ① Write \mathcal{R} and represents it by arrow diagram
 - ② Is \mathcal{R} function or not? Give reason.
-

B) If the Positive quantities $3K, 2L, M, 6N$ are in continued proportion, prove that: $\frac{L^3 + K^2}{27N + 4} = \left(\frac{2L^2}{3m}\right)^2$

Q4

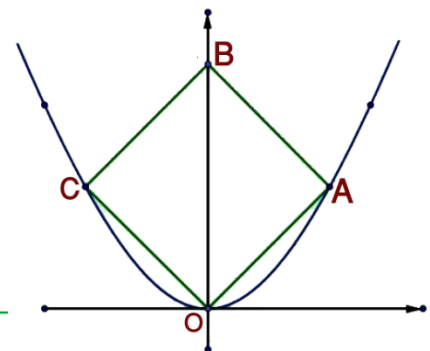
A) IF $\mathcal{F}(x) = 2x + K$, $\mathcal{G}(x) = x^2 + K$, and $\mathcal{F}(2) + \mathcal{G}(-4) = 30$,
Find $\mathcal{F}(-2) + \mathcal{G}(2)$

B) IF $Y = a - 9$, $Y \propto \frac{1}{x^2}$, and $a = 18$ at $X = \frac{3}{2}$, find the relation between X, y then find Y when $X = 1$

Q5

A) If $\frac{21x - y}{7x - z} = \frac{y}{z}$, prove that $Y \propto Z$

B) In the opposite figure:
The curve represents $\mathcal{F}(x) = x^2$
OABC is a square
Find the coordinate of A, B, C



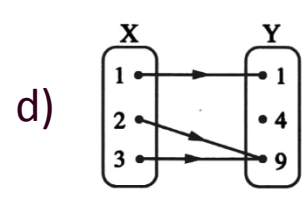
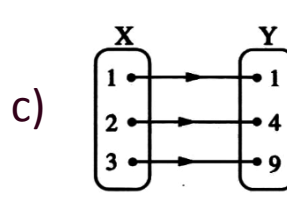
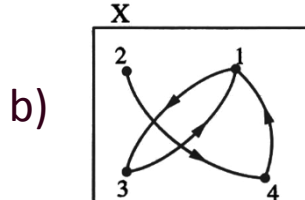
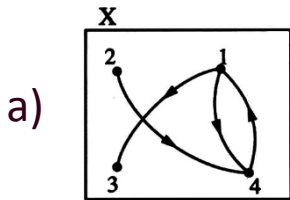
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End of the questions

ALGEBRA – MODEL No

14

Q1 A) Choose the correct answer:

(1) Which of the following relations not a function?

(2) If $X = \{3\}$, then X^2

- a) $\{9\}$ b) 9 c) $\{(3, 3)\}$ d) $\{(3, 9)\}$

(3) If $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{4}{5}$, then $b : c =$

- a) 3 : 4 b) 5 : 6 c) 6 : 5 d) 4 : 3

B): Find the arithmetic mean and the standard deviation for the values 8, 9, 7, 6, 5

Q2 A) Choose the correct answer:(1) If $\mathcal{F}(x - 1) = X + 2$, then $\mathcal{F}(4) = \dots\dots\dots$

- a) 5 b) 6 c) 7 d) 8

(2) If $a, X, b, 2X$ are proportional quantities, the $\frac{a}{b} = \dots\dots$

- a) 2 b) $\frac{1}{2}$ c) $\frac{1}{3}$ d) $\frac{1}{4}$

(3) The relation which represents direct variation between X, Y is ...

- a) $XY = 5$ b) $\frac{x}{5} = \frac{y}{3}$ c) $Y = X + 3$ d) $\frac{x}{5} = \frac{4}{y}$

B): If $\frac{x+y}{7} = \frac{y-2z}{5} = \frac{z+x}{4}$, **Find** the numerical value of $\frac{3x+2y}{x+3y-3z}$

Q3

A) If $X = \{-2, 2, 5\}$, $Y = \{3, 7, K\}$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $b = a^2 - 1$ " for $a \in X$, $b \in Y$:

- ① Find the value of K
- ② Represents \mathcal{F} by arrow diagram

B) If a, b, c, d are in continued proportion, prove that:

$$\Rightarrow \frac{a^2 + d^2}{c(a+c)} = \frac{b}{d} + \frac{d}{b} - 1$$

Q4

A) If the curve of $\mathcal{F}: \mathcal{R} \rightarrow \mathcal{R}$, $\mathcal{F}(x) = m - x^2$ cut X -axis at the point $(-2, b)$. **Find** the value $m^b + 2m$

B) IF $Y = a + 2$, $a \propto \frac{1}{x}$, and $a = 5$ at $X = 2$, find the relation between X, y then **find** Y when $X = 1$

Q5

A) If $2a = 3b = 4c$, **find** the numerical value of $\frac{a^2 + b^2 + c^2}{a(b+c)}$

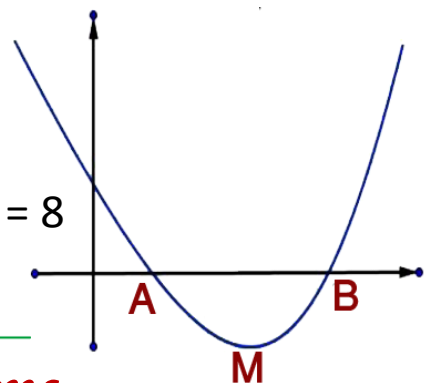
B) **In the opposite figure:**

The curve of quadratic function $F(x)$

Cuts X -axis in $A(1, 0)$, $B(4, 0)$

M is vertex of the curve and $F(-2) + F(7) = 8$

Find the value of $F(-2)$



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End of the questions

ALGEBRA – MODEL No

15

Q1) A) Choose the correct answer:

(1) If $(X - Y) \times Y = \{(1,2), (1,3)\}$, $n(X \times Y) = 6$, then $X = \dots\dots\dots$

- a) $\{1\}$ b) $\{1, 2\}$ c) $\{1, 3, 6\}$ d) $\{1, 3, 2\}$

(2) If $\mathcal{F}(x) = X - 5$, and $\frac{1}{2} \mathcal{F}(a) = 3$, then $a = \dots\dots\dots$

- a) 2 b) 8 c) 11 d) 16

(3) If $X \in \mathcal{R}^-$, then the point $(-X, \sqrt[3]{x})$ lies in the $\dots\dots\dots$ quadrant.

- a) First b) Second c) Third d) Fourth

B): If $4a^2 + 9b^2 = 12ab$, **prove that:** $a \propto b$

Q2) A) Choose the correct answer:

(1) If $\mathcal{F}(x^2) = x + 2$, then $\mathcal{F}(9) = \dots\dots\dots$

- a) 5 b) 7 c) 11 d) 83

(2) If $\frac{a}{b} = \frac{2}{3}$, $\frac{a}{c} = \frac{4}{5}$, then $b : c = \dots\dots\dots$

- a) 3 : 4 b) 5 : 6 c) 6 : 5 d) 4 : 3

(3) The relation represents inverse variation between Y, X is $\dots\dots\dots$

- a) $Y = 4X$ b) $\frac{x}{y} = \frac{5}{7}$ c) $\frac{x}{5} = \frac{2}{y}$ d) $Y = X + 5$

B): If $\frac{x+y}{3} = \frac{y+z}{8} = \frac{z+x}{6}$,**Prove that:** $\frac{x+y+z}{2x+3y+3z} = \frac{17}{50}$

Q3

A) If $X = \{-3, -2, -1, 0, 1, 2, 3\}$, $Y = [0, 9[$ and \mathcal{R} is a relation from X to Y where $a \mathcal{R} b$ means " $a^2 = b$ " for $a \in X, b \in Y$:

- ① Write \mathcal{R} . ② Is \mathcal{R} is a function or not? Give reason.

B) If $\frac{21x+a}{7x+b} = \frac{a}{b}$, $x \neq 0$, find the value of $\frac{a+2b}{2a}$

Q4

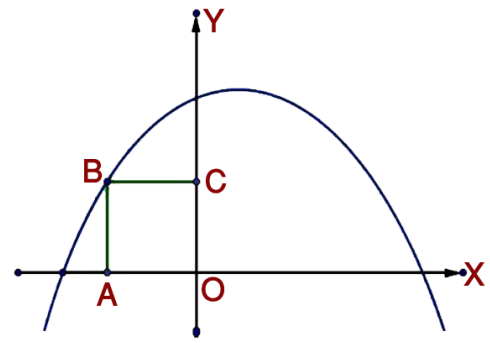
A) In the opposite figure:

The opposite figure represents

Curve of $\mathcal{F}(x) = -x^2 - x + 5$

If OABC is square,

Find its area?



B) IF $Y = K + m$, K is constant, $m \propto X$, and $Y = 3$ at $X = 0$, $Y = 5$ at $X = 3$ find the relation between X, y then **Find** Y when $X = 7$

Q5

A) If $\mathcal{F}(x) = Kx^2 + (3K + 2)x + 6$ and the X -coordinate of the vertex of $\mathcal{F}(x)$ equals 2, **Find** the value of K then find $\mathcal{F}(1) + \mathcal{F}(-1)$

B) The following table represents the excellent pupils in mathematics in 10 preparatory schools in Dakahlia:

No. of pupils	4	6	8	5	Sum
No. of schools	1	2	3	4	10

Find the arithmetic mean and standard deviation for the number of excellent pupils

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End of the questions

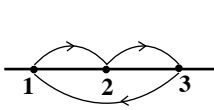
(1) Cairo

1 Complete each of the following:

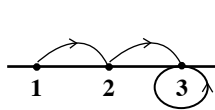
- a) If $\frac{a}{2} = \frac{b}{3} = 5$, then $a + b = \dots\dots\dots$.
- b) The range of the values 2, 9, 6, 16, and 8 is $\dots\dots\dots$.
- c) If 4, 6, and x are in proportion, then $x = \dots\dots\dots$.
- d) The point (1 , -1) lies on $\dots\dots\dots$ Quadrant.
- e) The positive square root of the average of squares deviations of values from the mean is called $\dots\dots\dots$.
- f) If $\frac{a}{\sqrt{3} - \sqrt{2}} = \frac{b}{\sqrt{3} - \sqrt{2}} = 1$, then $a b = \dots\dots\dots$.

2 Choose the correct answer:

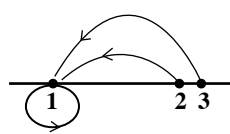
- a) If $X \times Y = \{(1, 3) , (1, 4)\}$ then $n(X) = \dots\dots\dots$. (1 , 2 , 3 , 4)
- b) In the opposite figures, if R is a function on $X = \{1, 2, 3\}$ of range $= \{1\}$, then the graph that represent it is $\dots\dots\dots$



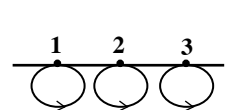
a)



b)



c)



d)

- c) If $f(x) = 4x + b$, $f(3) = 15$ then $b = \dots\dots\dots$. (156 , 3 , 4 , -3)
- d) If $\frac{y}{x} = 5$, then $y \propto \dots\dots\dots$. (x , $\frac{1}{x}$, x^5 , $\frac{1}{x^5}$)
- e) If $\frac{a}{b} = \frac{c}{d} = \frac{3}{4}$, then $\frac{a+c}{b+d} = \dots\dots\dots$. ($\frac{3}{4}$, $\frac{7}{4}$, $\frac{3}{7}$, $\frac{9}{16}$)
- f) Which of the following relations represents an inverse variation between the two variables x and y ? ($y = \frac{x}{7}$, $xy = 7$, $y = 7x$, $\frac{y}{x} = \frac{7}{2}$)

- 3 a) If $x = \{1 , 2 , 3\}$, $y = \{1 , 3 , 6 , 9 , 12\}$ and R is a relation from x to y where $a R b$ means " $a = \frac{1}{3} b$ " for all $a \in x$, $b \in y$. Write R and prove that R is a function and write its range.

- b) If $y \propto x$, $y = 6$ when $x = 3$, then find the relation between x and y .

- 4 a) Draw the function f where $f(x) = x(6 - x) + 4$, $x \in [-1 , 7]$

- b) If b is the middle proportional between a and c , then prove that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$

5 a) If $\frac{a}{2} = \frac{b}{5} = \frac{2a+b}{3x}$, then find the value of x.

b) Calculate the mean of the values : 2, 3, 6, 8, and 11 , then deduce their standard deviation.

(2) Giza

1 Complete the following:

a) If $n(X) = 5$, $n(X \times Y) = 15$ then $n(Y) = \dots\dots\dots$.

b) If $a = \sqrt{3}$, $b = \sqrt{2}$ then the value of $a^4 - b^4 = \dots\dots\dots$.

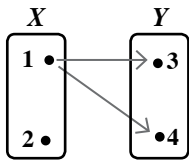
c) If $F : R \rightarrow R$, $f(x) = 3x$ represented by a straight line passing through $(-4, \dots)$

d) If $X = \{2, 3\}$ then $X^2 = \dots\dots\dots$. e) If $y = 3x$ then $y \propto \dots\dots\dots$.

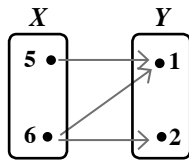
f) The range for the set 12 , 15 , 19 , 25 and 30 equals $\dots\dots\dots$.

2 Choose the correct answer:

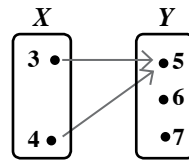
1) The diagram that represents a function is $\dots\dots\dots$.



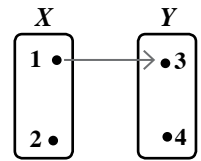
(a)



(b)



(c)



(d)

2) If $f(x) = x^3$, then $f(2) + f(-2) = \dots\dots\dots$.

a) 0

b) 2

c) 3

d) 8

3) The middle proportion between the two numbers 4 and 36 = $\dots\dots\dots$.

a) 32

b) 40

c) 12

d) ± 12

4) If $\frac{x}{3} = \frac{8}{12}$ then $x = \dots\dots\dots$.

a) 6

b) 5

c) 4

d) 2

5) The mean for the values 3, 4, 6 and 7 equals $\dots\dots\dots$.

a) 5

b) 10

c) 20

d) 40

6) If $\frac{x}{y} = \frac{2}{3}$ then $\frac{3x}{5y} = \dots\dots\dots$.

a) $\frac{2}{3}$

b) $\frac{2}{5}$

c) $\frac{3}{5}$

d) $\frac{5}{8}$

3 a) If $x = \{2, 3, 4, 7\}$, $y = \{1, 2, 3, 4, 7, 8\}$ and R is a relation from x to y where $a R b$ means that “a - b is a prime number” for all $a \in X, b \in Y$. Write R, represent it by an arrow diagram.

b) If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 2$

Find: 1) The relation between x and y 2) The value of y when $x = 1.5$

4 a) Find the number that if subtracted thrice from the two terms of ratio $\frac{49}{69}$ the ratio becomes $\frac{2}{3}$.

b) Draw the function $f(x) = 4 - x^2$ where $x \in [-3, 3]$ then find:

i) max. point of $f(x)$ ii) equation of axis of symmetry.

5 a) If a, b, c and d are proportional. **Prove that:** $\frac{a-b}{b} = \frac{c-d}{d}$

b) The following frequency distribution shows the marks of 40 students in an exam:

Sets	0 –	4 –	8 –	12 –	16 - 20	Total
Frequency	2	5	8	15	10	40

Find: The standard deviation for this distribution.

(3) Alexandria

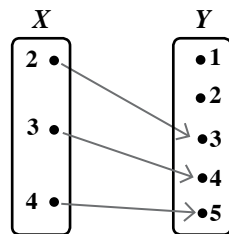
1 Choose the correct answer:

a) The middle proportional between 3, 27 is (–9 or 9 or ± 9 or 21)

b) **In the opposite function:**

Represents a function from $X \rightarrow Y$, then its range is

({2, 3, 4} or {2, 3, 5} or {3, 4, 5} or Y)



c) If y varies inversely with x and $x = \sqrt{3}$ when $y = \frac{2}{\sqrt{3}}$ then the constant of proportion equals ($\frac{1}{2}$ or $\frac{2}{3}$ or 2 or 6)

d) The most repeated value in a set of values represents is

(median or rang or mode or mean)

e) If $f(x) = 5x + 4$ represented by a straight line passing through (3, b) then $b = \dots\dots\dots$ (5 or 4 or 3 or 9)

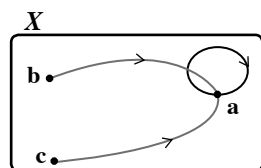
f) If $2a = 3b$ then $\frac{5b}{a} = \dots\dots\dots$ ($\frac{5}{3}$ or $\frac{5}{2}$ or $\frac{15}{2}$ or $\frac{10}{3}$)

2 Complete:

a) **In the opposite figure:**

Represents a function on X , its range =

- 1) {a} 2) {a, b, c}
3) {a, b} 4) {b, c}



- b) The range for the values 7, 4, 9, 5 and 13 is
- c) The function f where $f(x) = -3$, intersects Y-axis in the point (.....,)
- d) If $\frac{a}{b} = \frac{3}{2}$ then $\frac{a+b}{a-b} = \dots\dots\dots$
- e) The relation between the distance and time at uniform velocity is called variation.
- f) If $(x+5, 8) = (1, 64+x)$ then $y = \dots\dots\dots$
- 3** a) If the straight line which represents $F: \mathbb{R} \rightarrow \mathbb{R}$ where $f(x) = 6x - a$ cut y-axis at $(b, 3)$ find a, b
- b) If b is a middle proportional of a and c prove that $\frac{a^3 + b^3}{b^3 + c^3} = \frac{a^2}{bc}$
- 4** a) Find the number which if added to the two terms of ratio 7 : 11 it will be 2:3
- b) If $x = \{0, 1, 2, 3, 4, 5, 6\}$, R is a relation on x such that $a R b$ means “a twice b” for all $a, b \in x, a \neq b$.
- 5** a) If $x = L + 9$ and $L \propto y$ then find the relation between x and y know that $x = 24$, when $y = 5$, then find the value of y when $x = 12$.
- b) Calculate the standard deviation for the values : 12, 13, 16, 18, 21.

(4) Al Menofia

1 Choose the correct answer:

- a) If $n(x^2) = 9$ then $n(x) = \dots\dots\dots$ (1, 2, 3, 4)
- b) The range of values 1, 5, 12, 10, 9 and 5 is (5 or 7 or 10 or 11)
- c) If $\frac{a}{b} = \frac{b}{c} = \frac{c}{5} = 2$ then the value of $a = \dots\dots\dots$
(5×2^2 or 40 or 10 or 2×5^3)
- d) If $yx^2 = 5$ then y changes inversely with = ($\frac{1}{x^2}$ or $\frac{1}{x}$ or x or x^2)
- e) If $f(x) = 6x$, then $f(2) + f(-2) = \dots\dots\dots$ (0, 1, 12, 24)
- f) If $5a, 2, 3b$ and 7 are proportional quantities when $\frac{a}{b} = \dots\dots\dots$
($\frac{3}{7}$ or $\frac{6}{35}$ or $\frac{3}{5}$ or $\frac{3}{2}$)

2 Complete the following:

- a) If the standard deviation of a set of values equal zero then
- b) If $f(x) = 5x - 7$ then $f(3) = \dots\dots\dots$
- c) If $y \propto x$ and $y = 8$ when $x = 2$ so $y = \dots\dots\dots$ when $x = 3$

d) If $x \in \mathbb{R}^+$ and $(x^2 + 3)(x + \sqrt{3})(x - \sqrt{3}) = 7$ then $x = \dots\dots\dots$

e) If $\frac{x}{y} = \frac{3}{5}$ then $\frac{5x}{3y} = \dots\dots\dots$

f) If $(5, x-7) = (y+1, -5)$. Then $x + y = \dots\dots\dots$

3 a) If a, b, c and d are proportional quantities, **Prove that:** $\frac{d}{c+d} = \frac{b}{a+b}$

b) Graph $f(x) = -x^2 + 1, x \in [-3, 3]$

4 a) If $y \propto \frac{1}{x}, y = 6$ at $x = 3$

1) **Find:** the relation between x, y

2) **Find:** y at $x = 2$

b) IF $x = \{1, 3, 5\}$ and R is a function on x where $R = \{a, 3\}, (b, 1), (1, 5)\}$ then find $a + b$. **Find** the value of : $\frac{x^3 - y^3}{x - y}$

5 a) If b is a middle proportional between a and c .

Prove that: $\frac{a^2 + b^2}{b^2 + c^2} = \frac{a}{c}$

b) The following frequency distribution shows the number of goals scored in 30 matches.

Number of goals	zero	1	2	3	4	5
Number of matches	1	4	5	9	6	5

Find the mean and the standard deviation for the number of goals.

(5) Al Gharbia

1 Complete the following:

a) The point $(-1, 1)$ lies on the quadrant.

b) If $n(X) = 3, n(X \times Y) = 12$, then $n(Y) = \dots\dots\dots$

c) If $ad = bc$ then $\frac{a}{c} = \dots\dots\dots$

d) The middle proportional between 4 and 9 =

e) The range for the values 7, 4, 9, 5, 13 is

f) If $xy = -5$ then $y \propto \dots\dots\dots$

2 Choose the correct answer from those between brackets:

a) If $x \times y = \{(1, 3), (1, 4)\}$ then $n(x) = \dots\dots\dots$ (1, 2, 3, 4)

b) If $X = \{3, 4\}, Y = \{5, 6, 2\}$, then $(6, 4) \in \dots\dots\dots (X \times Y, Y \times X, X^2, Y^2)$

c) The fourth proportional for the numbers 2, 6, 9 is

(12 or 18 or 27 or 54)

- d) If $y \propto x$ and $y = 6$ at $x = 2$ then $y = \dots\dots\dots$ when $x = 3$.
 (6 or 9 or 12 or 18)
- e) The mean for 30 , 20 , 50 , 60 is (25 or 40 or 50 or 55)
- f) If $\frac{a}{b} = \frac{3}{2}$ then $\frac{a-b}{a+b} = 2$ then the value of $a = \dots\dots\dots$.
 ($\frac{3}{2}$ or 5 or $\frac{1}{5}$ or $\frac{2}{3}$)

- 3** a) Two integer numbers, the ratio between them is 3:7 and if subtracted 5 from each term, the ratio between each of them becomes 1:3. Find the two numbers.
- b) If $x = \{2, 4, 8\}$, $y = \{4, 6, 12, 24\}$ and R is a relation from x to y . Where aRb means $b > 2a$ for all $a \in x, b \in y$ write R , represent it by an arrow diagram, Cartesian diagram.
- 4** a) If a, b, c and d are four proportional quantities. Prove that $\frac{ac}{bd} = \left(\frac{a-c}{b-d}\right)^2$
- b) If $y \propto \frac{1}{x}$ and $y = 2$ when $x = 4$.
Find: 1) The relation between x and y . 2) The value of y when $x = 16$.
- 5** a) Draw the function $f(x) = 2 - x^2$ where $x \in [-3, 3]$ then find:
 i) max. point of f ii) equation of the axis of symmetry.
- b) Calculate the standard deviation for the values: 6 , 7 , 8 , 9 and 10.

(6) Al Dakahlia

1 Complete the following:

- a) If $Y \propto X$ and $Y = 6$ when $X = 4$ then $\frac{Y}{X} = \dots\dots\dots$.
- b) The linear function $y = 2x - 1$ represented by a straight line cut y-axis at
- c) The arithmetic mean of the values 4 , 13 , 18 , 25 , 30 is
- d) If $\frac{a}{b} = \frac{7}{4}$ then $\frac{4a}{b} = \dots\dots\dots$.
- e) One third the number 3^{18} in the form a^n is
- f) If 1 , x , 9 , y are in continued proportion then $x = \dots\dots\dots$, $y = \dots\dots\dots$, where x, y are + ve.

2 Choose the correct answer:

- 1) Biggest value - smallest value for a given data is
 a) Median b) Range c) Mode d) Standard deviation
- 2) If $\frac{a}{5} = \frac{b}{2} = \frac{a-2b}{k}$ then $k = \dots\dots\dots$.
 a) 5 b) 2 c) 3 d) 1

3) If $n(x^2) = 9$ then $n(x) = \dots\dots\dots$

- a) 3 b) 6 c) 18 d) 81

4) If $1 + 4x^2y^2 = 4 \times y$ then $\dots\dots\dots$

- a) $y \propto \sqrt{x}$ b) $y \propto \frac{1}{x}$ c) $y \propto x$ d) $y \propto \frac{1}{x^2}$

5) The value of x which satisfies the equation $2^x + 2^{x+1} = \frac{2}{3}$ is $\dots\dots\dots$

- a) 1 b) zero c) -1 d) 2

6) If the function $f(x) = 6$, then $\frac{f(3)}{f(a)} = \dots\dots\dots$

3 a) If $\frac{x+y}{5} = \frac{y+z}{3} = \frac{x+z}{6}$ prove that: $\frac{x-z}{2} = \frac{x+y+z}{7}$

b) If $x = z + 8$ and $z \propto \frac{1}{y}$ and it $z = 2$ when $y = 3$, Find y at $x = 3$

4 a) If $x = \{0, 1, 2, 3, 4, 5, 6\}$, $y = R$ is a relation on x such that $a R b$ means "a twice b" all $a, b \in x$, $a \neq b$.

i) Write R , represent it by an arrow diagram.

ii) Is $(0,0) \in R$?

iii) Is $2 R 4$?

iiii) find x if $6 R x$

b) If a, b, c, d are in continued proportion **prove that:** $\frac{ab - dc}{b^2 - c^2} = \frac{a + c}{b}$

5 a) Draw the function $f(x) = x(6 - x) + 4$ on the interval $[-1, -7]$

b) The following table shows the number of goals scored in football matches.

Number of goals	zero	1	2	3	4	5	6
Number of matches	1	4	6	9	5	3	2

calculate the standard deviation of number of goals.

(7) Behera

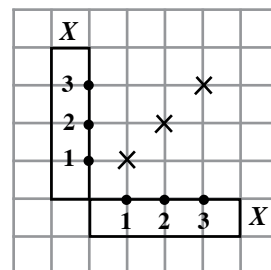
1 Choose the correct answer:

1) In the opposite figure:

The Cartesian diagram of a function on X ,

then its range = $\dots\dots\dots$

- a) $\{1, 2, 3\}$ b) $\{2, 1\}$
c) X d) $\{3\}$



2) The function $y = x + 3$ represented by a straight line cut x -axis at $\dots\dots\dots$

- a) -3 b) -2 c) 0 d) 3

- 3) If $x = \{5\}$, $y = \{3\}$ then $n(x \times y) = \dots\dots\dots$.
 a) 15 b) 8 c) 2 d) 1
- 4) The fourth proportional for the numbers 8 ,6 and 4 is
 a) 2 b) 3 c) 4 d) 7
- 5) The range for the values 7, 4, 9, 5 and 13 is
 a) 6 b) 7 c) 9 d) 5
- 6) If $\frac{a}{b} = \frac{5}{4}$ then $\frac{a+b}{a-b} = \dots\dots\dots$.
 a) $\frac{5}{4}$ b) 9 c) $\frac{4}{5}$ d) 2

2 Complete the following:

- a) If $f(x) = 3x + b$, $f(4) = 13$ then $b = \dots\dots\dots$.
- b) If $x + \frac{1}{x} = 2$ where $x \neq 0$, then $x^2 + \frac{1}{x^2} = \dots\dots\dots$.
- c) The quantities a , b and c are said to be in continued proportional if $\frac{a}{b} = \dots\dots\dots$
- d) If $y \propto x$ and $y = 6$ at $x = 2$ then $y = \dots\dots\dots$ when $x = 12$
- e) The positive square root to the average of squares deviations of values from the mean is called
- f) The proportion is the equality of

3 a) If $x = \{1, 2, 4\}$ and R is relation on x where $a R b$ means “ a is a multiple of b ” for all $a, b \in x$. Write R , represent it by an arrow diagram. Is R a function.

- b) If b is a middle proportional between a and c

Prove that: $\frac{a^3 + b^3}{b^3 + c^3} = \frac{a^2}{bc}$

4 a) If $\frac{x}{y} = \frac{3}{5}$ = find the value of the ratio: $\frac{3x - y}{5y - 2x}$

- b) If $Y \propto \frac{1}{X}$ and $Y = 5$ when $X = 15$

First: Find the relation between X and Y

Second: Find the value of X when $Y = 10$

5 a) If 5, 6, 7, 8 and 9 represent the marks of a pupil in mathematics test in 5 months.

Find the mean and the standard deviation.

- b) Draw the function $f(x) = 1 - x^2$ where $x \in [-3, 3]$ then find:

- i) max. point of $f(x)$ ii) equation of the axis of symmetry.

(8) Damietta

① Choose the correct answer from the given answers:

1. If $f(x) = 2x$ represented by a straight line passing through $(-3, \dots)$
 - a) -6
 - b) -5
 - c) -3
 - d) 2
2. The point $(-2, 1)$ lies on the quadrant
 - a) 1st
 - b) 2nd
 - c) 3rd
 - d) 4th
3. The point $(3, 0)$ lies on axis
 - a) 0
 - b) 1
 - c) 2
 - d) 3
4. If $x + \frac{1}{x} = 2$ then $x^2 + \frac{1}{x^2} = \dots$
 - a) 4
 - b) 2
 - c) zero
 - d) 5
5. If $\sum (x - \bar{x})^2 = 144$ for set of values whose number is 9 then $\sigma = \dots$
 - a) 16
 - b) 4
 - c) 12
 - d) 9
6. If $x : y = 3 : 2$, $y : z = 4 : 5$ then $x : y : z = \dots$
 - a) 2 : 4 : 5
 - b) 6 : 4 : 5
 - c) 4 : 6 : 5
 - d) 10 : 12 : 15

② Complete to make the following statements correct:

- a) The proportion is
- b) The most accurate measure of the dispersions is
- c) The middle proportional between the two numbers 4, 9 equals
- d) If $3a - 2b = \text{zero}$ then $\frac{a}{b} = \dots$.
- e) If $f(x) = x^2 + 7$ then $f(3) = \dots$.
- f) If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 20$ then $x = 12$ when $y = \dots$.

- ③ a) If $x = \{2, 4, 8\}$, $y = \{4, 6, 12, 24\}$ and R is a relation from x to y where aRb means $b > 2a$ for all $a \in x, b \in y$ write R , represent it by an arrow diagram, Cartesian diagram.

Then find the value of the result when $x = 1$.

- b) If $2a = 5b$ find the value of: $\frac{8a^2 - ab}{4ab + 5b^2}$

- ④ a) Draw the function $f(x) = x^2 - 4$ where $x \in [-3, 3]$ then **find**:

- i) max. point.
- ii) equation of the axis of symmetry.
- b) If $y \propto x$ and $y = 14$ when $x = 42$ **Find**:
 - 1) The relation between y and x .
 - 2) Value of y when $x = 20$

5 a) If $\frac{a}{4x+y} = \frac{b}{x-4y}$ prove that: $\frac{a+b}{5x-3y} = \frac{a-b}{3x+5y}$

b) The following table shows frequency distribution of the number of goals scored by 100 players in five penalties:.

Number of goals	zero	1	2	3	4	5	Total
Number of players	3	16	17	25	20	19	100

Calculate the mean and the standard deviation to the number of recorded goals.

(9) Port Said

1 Complete the following:

a) From the data of the following table:

X	3	5	6	10
Y	10	6	5	3

The kind of variation between y and x is

b) The point (0 , 4) lies on axis.

c) If the mean of the values: 10, x, 18 , 12 equal 15 then x =

d) If $y \propto x$ then $y = \dots\dots\dots$

e) Resources of collecting data are,

f) The middle proportional between 2 , 18 , is

2 Choose the correct answer:

1) If $xy = \{(1,3) , (1,4)\}$ then $n(x) = \dots\dots\dots$

a) 1 b) 2 c) 3 d) 4

2) If $(2, b) \in f$ where $f(x) = 3x - 6$ then $b = \dots\dots\dots$

a) 0 b) 2 c) 7 d) 9

3) If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{2a-b+c}{x}$ then $x = \dots\dots\dots$

a) 9 b) 8 c) 7 d) 5

4) If $a = \sqrt{5}$, $b = \sqrt{7}$ then $a^4 \times b^{-4} = \dots\dots\dots$

a) $\frac{7}{5}$ b) $\frac{5}{7}$ c) $\frac{25}{49}$ d) $\frac{49}{25}$

5) If $(x-5 , 7-x)$ lies on the 2nd quadrant then $x = \dots\dots\dots$

a) 3 b) 5 c) 7 d) 9

6) If $y \propto \sqrt{x}$ and $y = 5$ when $x = 9$ then $y = \dots\dots\dots$

a) 5x b) $\frac{5}{3}x$ c) 3x d) $\frac{3}{5}x$

- 3 a) Represent graphically the function $f(x) = (x-3)^2$ where $x \in [0, 6]$ and from the graph find the vertex point and max. and minimum point at the function.

b) If $\frac{a+b}{3} = \frac{2b+c}{6}$ = prove that : $c \propto a$

- 4 a) If $x = \{1, 2, 5, 7\}$, $y = \{2, 3, 7, 8\}$ and R is a relation from x to y where a $R b$ means “ $a+b$ is an odd number” for all $a \in x$, $b \in y$ write R and represent it by an arrow diagram.

- b) If a, b, c and d are four real proportional quantities. Then prove that:

$$\frac{ac}{bd} \left(\frac{a-c}{b-d} \right)^2$$

- 5 a) If y changes inversely with x and $y = 2$ when $x = 4$ then

Find the value of y when $x = 16$

- b) The following frequency distribution shows the ages of 20 children.

Ages in year	2	4	6	8	10	Total
Number of children	3	4	7	5	1	20

Calculate: The standard deviation to ages in years.

(10) Suez

1 A) Complete:

1. The point $(5, -3)$ lies on the quadrant.

2. If $x = \{5, 6, 7\}$ then $n(x^2) = \dots\dots\dots$

3. If $y \propto x^2$ then $\frac{y_1}{y_2} = \dots\dots\dots$

B) If $x = \{0, 1, 2, 3, 4, 5, 6\}$, R is a relation on x such that a $R b$ means “ a twice b ” for all $a, b \in x$, $a \neq b$, then $R = \dots\dots\dots$

2 A) Complete:

1. The middle proportion for the values 1 and 4 equals

2. The mean for the values 4, 3, 2, 5, 1 is

3. If $f(x) = 5x - 7$ then $f(3) = \dots\dots\dots$

B) If $\frac{x}{y} = \frac{2}{3}$ Find the value of the ratio $\frac{6x - 2y}{y - x}$.



3 (A) Choose the correct answer:

- If $f(x) = x^3$ then $f(2) + f(-2) = \dots\dots\dots$ (zero or $\frac{1}{2}$ or 1 or 2)
- The range for the values 2 , 13 , 12 , 16 and 14 is $\dots\dots\dots$ (2 or 13 or 14 or 16)
- If $(2, -6) \in f$ where $f(x) = kx$, then $k = \dots\dots\dots$ (-1 or -2 or -3 or 3)

B) Represent graphically $f(x) = 2 - x$

4 (A) Choose the correct answer from the given answers:

- If $f(x) = 5x - 7$ then $f(3) = \dots\dots\dots$ (1, 5 , 7 , 8)
 - If $\frac{A}{B} = \frac{3}{4}$ then $4A - 3B + 5 = \dots\dots\dots$ (0 or 1 or 3 or 5)
 - If $y = \frac{-3}{x}$ then $\dots\dots\dots$ ($y = x$ or $y \propto x$ or $y \propto \frac{1}{x}$ or $yx = 0$)
- b) If a, b, c and d is continued proportional. **Prove that** $\frac{a+c}{b+d} = \frac{b}{c}$

5 a) If $Y \propto \frac{1}{X}$ and $Y = 1$ when $X = 2$.

Find: 1) The relation between X and Y . 2) The value of X when $Y = 4$.

b) The following distribution for the marks of some students in one of the exams:

Marks	0	1	2	3
Number of students	1	2	3	4

Find: 1) The mean. 2) The standard deviation for the marks of the students.

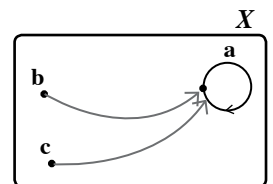
(11) Al Fayoum

1 Choose the correct answer between brackets:

a) In the opposite figure:

The range of the function = $\dots\dots\dots$

- $\{a\}$
- $\{a, b\}$
- $\{a, b, c\}$
- $\{b, c\}$



- The point $(7, -9)$ lies on the $\dots\dots\dots$ quadrant. (1^{st} , 2^{nd} , 3^{rd} , 4^{th})
- If $f(x) = x^7 - 3x^2$, then its degree = $\dots\dots\dots$

d) The positive middle proportional between the two numbers 2 , 8 equals $\dots\dots\dots$ (6 or 4 or -4 or 16)

e) If $\frac{x}{5} = \frac{y}{7}$ then the expression $7x - 5y + 9 = \dots\dots\dots$ (4 or 7 or 9 or $\frac{5}{7}$)

f) From the secondary resources to collect data is the
(interview or questionnaires or personnel database or observation and measurement)

2 Complete each of the following to get correct statements:

- a) The difference between the greatest value and the smallest value the set is called
b) The fourth proportional of the numbers 4 , 3 , 8 is
c) If $\frac{5a - 7b}{8a + 11b} = \text{zero}$ then $\frac{b}{a} = \dots\dots\dots$.
d) If $y \propto x$ and $y = 2$ when $x = 8$ then $y = \dots\dots\dots$ when $x = 12$.
e) The point (3 , 0) lies on axis.
f) If $f(x) = ax + b$, $f(y) = 13$ then $b = \dots\dots\dots$.

3 a) Graph $f(x) = x^2 - 6x + 9$, $x \in [0, 6]$.

b) If $\frac{x+y}{7} = \frac{x+z}{5} = \frac{z+x}{8}$ Prove that $\frac{x+y+z}{x-z} = 5$

4 a) If b is a middle proportional between a , c Prove that: $\frac{c}{a} = \frac{c^2}{b^2}$

b) If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 2$ Find:

- 1) The relation between x , y . 2) The value of y when $x = 1\frac{1}{2}$

5 a) If $x = \{1, 3, 4, 5\}$, $y = \{1, 9, 3, 4, 5, 6\}$ and R is a relation from x to y where a R b means “a + b = 7” for every $a \in x$, $b \in y$ write R and represent it by an arrow diagram and Cartesian diagram. Is R a function? Why?

b) The following is a frequency distribution which shows the number of children of some families in one of the new cities

Number of children	zero	1	2	3	4	Total
Number of families	5	7	7	5	6	30

Calculate the mean and the standard of the number of children

(12) Aswan

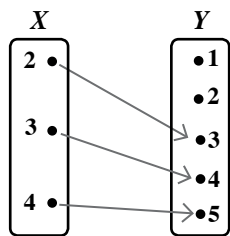
1 Choose the correct answer from the given ones:

- 1) The difference between the greatest value and the smallest value in the set called
a) median b) the range c) mode d) mean

2) In the opposite function:

Represents a function from $X \rightarrow Y$, then its range is

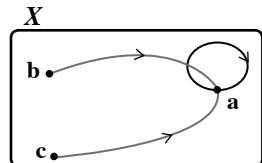
- a) $\{2, 3, 4\}$ b) $\{2, 3, 5\}$
c) $\{3, 4, 5\}$ d) Y



3) In the opposite figure:

Represents a function on X , its range =

- a) $\{a\}$ b) $\{a, b, c\}$
d) $\{a, b\}$ d) $\{b, c\}$



4) Which relation represents the inverse variation between y and x

- a) $y = 5x + 1$ b) $y = \frac{1}{2}x$ c) $xy = 7$ d) $\frac{x}{y} = \frac{2}{3}$

5) The mean for the values 2, 5, 7 and 10 is

- a) 2 b) 8 c) 4 d) 6

2) Complete the following statements:

- 1) If $y = 2x$, then $y \propto$
- 2) If the function $f : f(x) = -2$, then $f(x + 2) =$
- 3) If $5a = 7b$, then $\frac{b}{a} =$
- 4) If 2, x , 4, 6 are proportional quantities, then $x =$
- 5) The value of the expression $2^{\text{zero}} + 2^{-1} - \left(\frac{-1}{\sqrt{2}}\right)^2 =$
- 6) If $\frac{a}{3} = \frac{b}{5} = \frac{a+b}{2x}$, then $x =$

3) a) Graph $f(x) = x^2 - 2x$, $x \in [-1, 3]$.

b) The point $(-1, -1)$ is located in the quadrant.

- a) first b) second c) third d) fourth

4) a) First

x	3	5	4
y	20	12	15

1) From the opposite table write the type of variation that data represents between y and x .

2) Write the relation between y and x .

b) Find x when $y = 40$

5 a) First: If $y \propto x$ and $y = 6$ when $x = 2$, find the value of y when $x = 5$

Second: Calculate the standard deviation of the following values 12, 14, 16 and 18.

b) Find the two numbers which the ratio between them equals $7 : 12$, and one of them is more than the other by 275.

(13) Kafr El-Sheikh

1 Choose the correct answer:

1) The middle proportional between $3b$, $12a^2b$ is ($-6a$, $\pm 6b$, $\pm 6ab$, ab)

2) If $\frac{a}{b} = \frac{2}{5}$, then $\frac{a-b}{a+b} = \dots\dots\dots$ ($\frac{3}{7}$, $-\frac{3}{7}$, $\frac{7}{3}$, $-\frac{7}{3}$)

3) The range of the set of values: 8, 3, 5, 12, 10 is (7, 8, 9, 10)

4) If the point $(3, a)$ lies on the X-axis then $a = \dots\dots\dots$
(-3 , 3 , zero, 2)

5) The fourth proportional of the numbers 2, 5, 8 is (20, 22, 25, 30)

6) If y varies inversely with \sqrt{x} and $y = 3$ when $x = 16$,

Then the constant of variation = ($\frac{4}{3}$, $\frac{3}{4}$, -12 , 12)

2 Complete:

1) If $f(x) = x^3 - (5 + x^3)$ of degree.

2) If a weight of a body on the earth (R) directly changes with its weight on the moon (W). If $R_1 = 182$ kg, $W_1 = 35$ kg, then find W_2 when $R_2 = 312$ kg.

3) If 15 workers need 16 days to finish a certain job. How many workers are needed to finish the same job in 12 days?

4) A car moves with a uniform velocity, where the covered distance varies directly with the time. If the car covers a distance 120 km in 5 hr. Find the distance covered by that car in 8 hr.

5) If Y varies directly as x and inversely as z , then $y \propto \dots\dots\dots$

6) $f(x) = x^2 - 10x + 25$, then $f(4) - f(6) = \dots\dots\dots$

7) If the mean of numbers: $3a - 3$, $3a - 1$, $2a + 1$, $2a + 3$, $2a - 6$ is 6 then $a = \dots\dots\dots$

8) If $x^2 - 4xy + 4y^2 = 0$, then $y \propto \dots\dots\dots$

3 If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4}$, find the value of $\frac{2a - b + 5c}{3b - a}$

4 a) If: $Y \propto \frac{1}{x}$, where $y = 2$ when $x = 3$

Find the relation between y and x , then find the value of y when $x = 12$

b) Graph $f(x) = -x^2$, $x \in [-2, 2]$

5 a) If the number of hours (y) is proportionally inverse with the number of workers (x), and 66 workers fulfilled the work in 4 hours. What is the time needed for 8 workers to fulfill this work?

b) **Find** the standard deviation (show steps)

Degree	5	8	9	10	12	Total
Frequency	1	2	3	3	1	10

Answer the following questions : (calculators is allowed)

[Q1] Choose the correct answer from those given:

1- If $n(X) = 3$, $n(X \times Y) = 21$ then $n(Y) = \text{-----}$

- (a) 5 (b) 7 (c) 21 (d) 3

2- If $8^{x-9} = 1$, then $X = \text{-----}$

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- (a) 8 (b) zero (c) 9 (d) 1

3- If $XY = 4$, then $Y \propto \text{-----}$

- (a) $X - 4$ (b) X (c) $\frac{1}{X}$ (d) $X + 4$

4- The solution set of the equation $X^2 + 9 = 0$ in R is--

- (a) $\{ 3 \}$ (b) $\{ -3 \}$ (c) $\{ -3 , 3 \}$ (d) \emptyset

5- The range of the set of the values 6,5,9,13,10 is --

- (a) 8 (b) 5 (c) 9 (d) 10

6- If $\frac{2X}{5} = 6$ then $3x = \text{-----}$

- (a) 30 (b) 45 (c) 12 (d) 15

[Q2]

A) If $X = \{ 2, 5, 7 \}$, $Y = \{ 1, 3, 6, 11 \}$ and R is
a relation from X to Y Where " $a R b$ " means
" $a + b = 8$ " for each $a \in X$, $b \in Y$.

1. Write R and represent it by an arrow diagram.
2. Show that R is a function and find its range.

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B) If $\frac{X}{Y} = \frac{4}{3}$, Find the value of : $\frac{3X + 2Y}{6Y - X}$

In the simplest form .

[Q3]

A) If $Y \propto X$ and $Y = 16$ when $X = 4$, Find:

1) The relation between Y and X

2) Find the value of Y where $X = 5$

B) If b is the middle proportion between a and c

prove that
$$\frac{a-b}{b} = \frac{a-c}{b+c}$$

[Q4]

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A) If $(X+5, 7) = (8, Y+3)$

Find the value of $\sqrt{x^2 + y^2}$

B) If 3, b, 12 are three positive proportional quantities .

Find the value of $4b+1$

[Q5]

A) Represent graphically the function F where

$$F(X) = X^2 - 3 \text{ taking } X \in [-3, 3], \text{ from the}$$

graph deduce:-

1- The coordinates of the vertex of the curve.

2- The minimum value of the function and

The equation of the axis of symmetry

B) Find the standard deviation for the

values 8, 9, 7, 6, 5

انتهت الأسئلة مع التمنيات بالتوفيق

ISMAILIA GOVERNORATE
DIRECTORATE OF EDUCATION
BASIC EDUCATION CERTIFICATE EXAMINATION
FIRST SESSION EXAM 2020

Mathematics
Abil Rashed

MATHS (ALGEBRA AND STATISTICS)

TIME : 2 HOURS

تنبيه : الأسئلة في ورقة واحدة من الوجهين

ANSWER THE FOLLOWING QUESTIONS (استخدم الآلة الحاسبة)

QUESTION 1:

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Choose the correct answer from those given answers:

✓ ① $\sqrt{36} + \sqrt{16} = \dots\dots\dots$

a) 10

b) 24

c) 52

d) 100

✓ ② The middle proportional between 3 , 27 is

a) 9

b) -9

c) ± 9

d) 1

✓ ③ If $f(x) = 2$ then $f(2) + f(-2) = \dots\dots\dots$

a) zero

b) 4

c) -4

d) 1

✓ ④ The positive number which twice its square = 50 is

a) 5

b) 10

c) 25

d) 100

✓ ⑤ If $x + y = xy = 5$, then $x^2 y + y^2 x = \dots\dots\dots$

a) 10

b) 15

c) 20

d) 25

✓ ⑥ The simplest and easiest method of measuring dispersion is

a) the range

b) the standard deviation

c) the arithmetic mean

d) the mode

QUESTION 2: $2 \times 2 = 4$ $2 \times 5 = 10$
 $2 \times 3 = 6$

✓ [A] If $X = \{ 2, 3, 5 \}$, $Y = \{ 4, 6, 8, 10 \}$ and R is a relation from X to Y where
" aRb " means " $2a = b$ " for all $a \in X, b \in Y$.

✓ (1) Write R and represent it by an arrow diagram .

✓ (2) Is the relation R represents a function ? Why ? and If it's a function find its range .

✓ [B] The ratio between two integers is 3:7 , If 5 is subtracted from each of them , then the ratio becomes 1 : 3 , Find the two numbers .

QUESTION 3:

[A] As Yousef was reading a book, He found out after 3 hours 50 pages remained, after 6 hours 20 pages remained.

If there was a relation between time (t) and the number of pages (Y).

Is a linear relation

① Represents the relation between (t), (Y), Then find the algebraic relation between them.

✓ ② How much time did Yousef takes to finish reading the book?

✓ ③ How many pages left when Yousef started reading?

[B] If x, y, z and L are proportional quantities

✓ Prove that : $\frac{y-x}{x} = \frac{L-Z}{Z}$

QUESTION 4:

[A] If $y \propto x$ and $y = 40$ at $x = 14$

✓ Find the relation between x and y, then Find the value of x when $y = 80$?

✓ [B] If $X \times Y = \{(1,2), (1,3), (2,2), (2,3)\}$

Find : ① $X \cup Y$ ✓ ② $n(Y^2)$

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QUESTION 5:

[A] Represent graphically the function f :

$$f(x) = (x - 2)^2, \text{ Taking } x \in [-1, 5]$$

And from the graph Find :

✓ ① The coordinates of the vertex of the curve.

✓ ② The equation of the line of symmetry.

✓ ③ The maximum or the minimum value of the function.

✓ [B] Find the standard deviation for the following set of values :

✓ 13, 14, 17, 19, 22

إنتهت الأسئلة



تنبيه : أسئلة هذا الامتحان في صفحتين - يسمح باستخدام الآلة الحاسبة .

Answer the following questions :

First question : Choose the correct answer :

- 1) If $n(x^2) = 9$, $n(x \times y) = 6$ then $n(y) = \dots\dots\dots$
(2 , 3 , 4 , 6)
- 2) If $xy = 3$ then $y \propto \dots\dots\dots$
($3x$, $\frac{3}{x}$, $\frac{1}{x}$, $\frac{x}{3}$)
- 3) $[2, 5] - \{2, 5\} = \dots\dots\dots$
($[1, 6]$, ϕ , $]2, 5[$, $\{0\}$)
- 4) $\sqrt{50} - \sqrt{8} = \dots\dots\dots$
($\sqrt{200}$, $\sqrt{98}$, $\sqrt{42}$, $\sqrt{18}$)
- 5) If $\sum (x - \bar{x})^2 = 48$ of a set of values and the number of these value = 12
then $\sigma = \dots\dots\dots$
(-2 , 2 , 4 , 6)
- 6) If $x - y = 5$, $x + y = \frac{1}{5}$ then $x^2 - y^2 = \dots\dots\dots$
($\frac{1}{25}$, 1 , 5 , 25)

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Second question :

- A) If $x = \{1, 3, 4, 5\}$, $y = \{1, 2, 3, 4, 5, 6\}$ and R is a relation from x to y
where "aRb" means $(a + b = 7)$ for each $a \in x$, $b \in y$
(1) Write R and represent it by an arrow diagram.
(2) Is R a function ? and why ?
- B) If $y \propto x$ and $y = 6$ when $x = 3$
Find : (1) The relation between x and y
(2) The value of y when $x = 5$

Third question :

- A) Represent graphically the function $f : f(x) = 4 - x^2$ taking $x \in [-3, 3]$ and from
the graph deduce : The coordinates of the vertex point of the curve, maximum
value of the function and the equation of line of symmetry.
- B) Find the positive number which its square is added to the antecedent of
the ratio 29 : 46 and subtracted its square from its consequent the ratio
become 3 : 2

Fourth question :

- A) If the straight line which represents the function $f: \mathbb{R} \rightarrow \mathbb{R}$, $f(x) = 6x - a$ intersects the y-axis at the point $(b, 2)$. Find the value of a and b .
- B) The following frequency distribution shows the marks of the number of student in an exam :

Marks	0	1	2	3	4	5	6
Number of students	3	4	6	9	5	3	4

- Find the standard deviation of marks.

Fifth question :

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- A) If $x = \{1, 3, 5\}$ and R is function on x and $R = \{(a, 3), (b, 1), (1, 5)\}$
Find : (1) The range of the function.
(2) The value of $a + b$.
- B) If a, b, c and d are proportional quantities prove that $\frac{a}{b-a} = \frac{c}{d-c}$

انتهت الأسئلة

Calculator is allowed)

Answer the following questions:-

Question (1) : Choose the correct answer from those given:

The simplest dispersion measure is

- (a) the arithmetic mean (b) the median (c) the range (d) the Mode

$$2x^2 \times 3x^1 = \dots\dots\dots$$

- (a) $6x^3$ (b) $5x^3$ (c) $6x^2$ (d) $5x^2$

If $X = \{ 3 \}$, $n(Y) = 5$ then : $n(X \times Y) = \dots\dots\dots$

- (a) 1 (b) 5 (c) 8 (d) 15

The simplest form of the expression: $3x - 4y + 5x + 7y$ is

- (a) $7x + 12y$ (b) $11xy$ (c) $10x + 9y$ (d) $8x + 3y$

The relation which represents an inverse variation between the two variables y and x is

- (a) $xy = 5$ (b) $y = x + 3$ (c) $\frac{x}{5} = \frac{y}{2}$ (d) $y = 2x$

If $\sqrt{x} = 4$ then : $x = \dots\dots\dots$ where $x \in \mathbb{Z}^+$

- (a) 2 (b) 4 (c) 8 (d) 16

- Question (2):
- a Graph the curve of the function $f(x) = x^2$ where $x \in [-3, 3]$, from The graph find:
- (1) The maximum or the minimum value of the function.
 - (2) The equation of the axis of symmetry.
- b Find the standard deviation to the set of the values: 15, 19, 20, 21, 25.

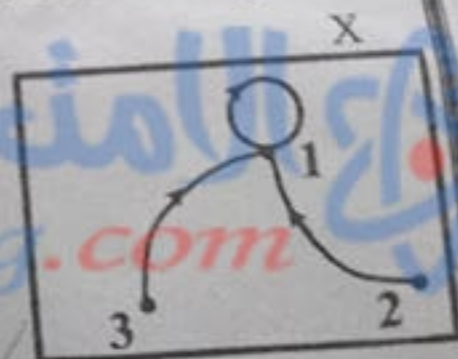
Question (3):

- a If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{5, 6\}$ find:
- (1) $X \times Y$
 - (2) $(X - Y) \times Z$
- b If x, y, z and L are proportional quantities prove that: $\frac{y-x}{x} = \frac{L-z}{z}$

Question (4):

- a Find the number which if add to both of terms of the ratio $3 : 5$ then it becomes $1 : 2$ ~~$\frac{3 \times 5}{5}$~~

b The opposite figure: the arrow diagram represents the relation R on the set X



1- write R

$$R = \{(1, 1), (2, 1), (3, 1)\}$$

2- Is R a function? if it's, find it's rang.

Question (5):

- a If $y \propto x$ and $y = 20$ as $x = 4$ find:

- (1) The constant of variation between y and x .
- (2) The value of x when $y = 40$

- b If $f(x) = 2x + k$, $f(5) = 13$ find the value of k .

(انتهت الأسئلة)

(Calculator is allowed)

Answer the following questions:-

Question (1) : Choose the correct answer from those given:

- The simplest dispersion measure is
(a) the arithmetic mean (b) the median (c) the range (d) the Mode
- $2x^2 \times 3x = \dots\dots\dots$
(a) $6x^3$ (b) $5x^3$ (c) $6x^2$ (d) $5x^2$
- If $X = \{3\}$, $n(Y) = 5$ then : $n(X \times Y) = \dots\dots\dots$
(a) 1 (b) 5 (c) 8 (d) 15
- The simplest form of the expression: $3x - 4y + 5x + 7y$ is
(a) $7x + 12y$ (b) $11xy$ (c) $10x + 9y$ (d) $8x + 3y$
- The relation which represents an inverse variation between the two variables y and x is
(a) $xy = 5$ (b) $y = x + 3$ (c) $\frac{x}{5} = \frac{y}{2}$ (d) $y = 2x$
- If $\sqrt{x} = 4$ then: $x = \dots\dots\dots$ where $x \in \mathbb{Z}^+$
(a) 2 (b) 4 (c) 8 (d) 16

Question (2) :

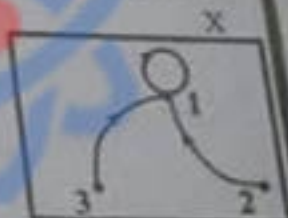
- Graph the curve of the function $f(x) = x^2$ where $x \in [-3, 3]$, from The graph find :
(1) The maximum or the minimum value of the function.
(2) The equation of the axis of symmetry.
- Find the standard deviation to the set of the values: 15, 19, 20, 21, 25.

Question (3) :

- If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{5, 6\}$ find :
(1) $X \times Y$ (2) $(X \times Y) \times Z$
- If x, y, z and L are proportional quantities prove that: $\frac{y-x}{x} = \frac{L-z}{L}$

Question (4)

- Find the number which if add to both of terms of the ratio 3 : 5 then it becomes 1 : 2
- The opposite figure : the arrow diagram represents the relation R on the set X .
1- write R
2- Is R a function ? If it's , find it's rang.



Question (5) :

- If $y \propto x$ and $y = 20$ as $x = 4$ find :
(1) The constant of variation between y and x .
(2) The value of x when $y = 40$
- If $f(x) = 2x + k$, $f(5) = 13$ find the value of k .



المادة : الجبر والإحصاء (بالتفاهة الانجليزية)
الزمن : ساعتان

محافظة القليوبية
مديرية التربية والتعليم

امتحان الفصل الدراسي الأول للإعدادية العامة لعام ٢٠١٩ م

Answer all the following questions:

Q 1 : Choose the correct answer :-

1) $\sqrt[3]{x^6} = \sqrt{\dots}$

a) X^3

b) X^2

c) X

d) X^4

2) If: $(X + 5, 8) = (1, 6y + X)$, then $y = \dots$

a) 5

b) 6

c) 2

d) 12

3) The solution set of the equation: $X^2 + 4 = 0$ in R is \dots

a) 4

b) ± 2

c) -2

d) 0

4) If: $xy = 7$, then $y \propto \dots$

a) $\frac{1}{x}$

b) $x - 7$

c) x

d) $x + 7$

5) If: $x^2 - y^2 = 16$ and $x + y = 8$, then $x - y = \dots$

a) 2

b) 1

c) 128

d) 64

6) If: $\sum (x - \bar{x})^2 = 36$ to the set of 9 values, then $\sigma^2 = \dots$

a) 2

b) 4

c) 18

d) 27

Q 2: a) Represent graphically the function f where $f(x) = (x - 2)^2$, $x \in [0, 4]$
From the graph, deduce:

1) The equation of the symmetry axis.

2) The maximum (minimum) values of the function.

b) If: $y \propto \frac{1}{x}$, and $x = 2\frac{4}{5}$ when $y = \frac{4}{7}$. Find the value of y , when $x = 3\frac{1}{5}$.

Q 3: a) If: $X = \{2, 3, 5\}$, $Y = \{4, 6, 8, 10\}$, and R is a relation from X to Y ,
where " $a R b$ " means " $2a = b$ " for each $a \in X$, $b \in Y$

1) Write R and represent it by an arrow diagram.

2) Is R a function?

b) If: a, b, c and d are proportional, prove that: $\sqrt[3]{\frac{5a^3 - 3c^3}{5b^3 - 3d^3}} = \frac{a + c}{b + d}$

Q 4: a) If: $X = \{2, 4\}$, $Y = \{4, 0\}$, $Z = \{4, 5, -2\}$

Find: 1) $(Z - Y) \times (X \cap Y)$ 2) $n(X^2)$

b) If: $f(x) = 4x + b$, $f(3) = 15$, Find the value of b

Q 5: a) If: $\frac{a}{2x + y} = \frac{b}{3y - x} = \frac{c}{4x + 5y}$, Prove that: $\frac{a + 2b}{7} = \frac{4b + c}{17}$

b) Find the standard deviation for this distribution:

X	Zero	1	2	3	4	5	Total
K	3	16	17	25	20	19	100

(انتهت الأسئلة)



Algebra and statistics

⌚ Time : 2 Hours

Answer the following questions

First question ⇒ Choose the correct answer:

① Double the number 2^8 is

- a) 2^{10} b) 2^{16} c) 4^8 d) 2^9

② If $xy = 3$ then $y \propto$

- a) x b) $3x$ c) $\frac{1}{x}$ d) $\frac{1}{3}x$

③ If $x^2 + y^2 = 25$, $(x+y)^2 = 49$, then $xy =$

- a) 6 b) 10 c) 12 d) 24

④ If $f(x) = 3$ then $f(3) + f(-3) =$

- a) 0 b) 1 c) -6 d) 6

⑤ $] - 2, 5[\cup \{-2, 5\} =$

- a) $[-2, 5]$ b) $[-2, 5[$ c) $] - 2, 5]$ d) $] - 2, 5[$

⑥ The range of the set of the values: 5 , 14 , 4 , 23 , 15 is

- a) 12 b) 14 c) 19 d) 23

Second question ↓

A) If $X = \{2, 5\}$; $Y = \{1, 2\}$, $Z = \{3\}$

then find: First: $n(X \times Z)$

Second: $(Y \cap X) \times Z$

B) If $f(x) = 4x + b$, $f(2) = 10$

then find the value of b .

Third question ↕

- A) If $X = \{2, 3, 5\}$, $Y = \{4, 6, 8, 10\}$ and R is a relation from X to Y where $a R b$ means " $a = \frac{b}{2}$ " for each of $a \in X$, $b \in Y$ write R and represent it by an arrow diagram.
Is R a function? and why?
- B) Find the number which if added to the two terms of ratio $7 : 11$ it will be $2 : 3$.

Fourth question ↕

- A) If $2a = 3b = 3c$ then find the numerical value of:

$$\frac{6a + b + c}{4a + 6b + 6c}$$

- B) Calculate the standard deviation for the following values:

55, 53, 57, 56, 54.

Fifth question ↕

- A) If $y \propto x$ and $y = 6$ when $x = 3$ find:

First: The relation between x , y

Second: The value of y when $x = 4$

- B) Represent graphically the curve of the function

$f(x) = 4 - x^2$ where $x \in [-3, 3]$ and from the graph deduce the vertex of the curve and the equation of the symmetry axis.

Third Year Preparatory Examination
(First Term, January, 2018)

Algebra

Time : 2 Hours

Answer the following questions :

1

Choose the correct answer from those given:

- ☒ a The range of the set of values 8 , 2 , 5 , 9 and 6 equals (4 , 5 , 6 , 7)
- ☒ b If $4a - 3b = 0$ then $a : b =$ (3 : 4 , 3 : 7 , 4 : 3 , 4 : 7)
- ☒ c If $x - y = 2$, $x + y = 6$ then $x^2 - y^2 =$ (3 , 4 , 8 , 12)
- ☒ d If $\frac{y}{x} = 5$ then $y \propto$ ($\frac{1}{x}$, x , $\frac{1}{x^2}$, $x + 5$)
- ☒ e The fourth proportional of the numbers 2 , 3 , 4 is (6 , 7 , 8 , 9)
- ☒ f If $(3^x, \sqrt{y}) = (1, 4)$ then $x + y =$ (2 , 3 , 16 , 17)

2

☒ a If $X = \{3, 4\}$, $Y = \{4, 5\}$, $Z = \{5, 6, 7\}$.

Find: (1) $X \times (Y \cap Z)$. $\{(3, 5), (4, 5)\}$ (2) $n(Y \times Z)$. 6

☒ b If a , b , c and d are proportional quantities then Prove that: $\frac{a^2 + c^2}{b^2 + d^2} = \frac{ac}{bd}$ m^2

3

☒ a If $X = \{1, 2, 3\}$, $Y = \{3, 4, 5, 7\}$ and R is relation from X to Y where $a R b$ means : $b = 2a + 1$ for each $a \in X$, $b \in Y$. $\{(1, 3), (2, 5), (3, 7)\}$

Write R and represent it by an arrow diagram. Is R a function? And Why? Yes, because

☒ b If $y \propto \frac{1}{x}$ and $y = 3$ when $x = 4$.

Find: (1) The relation between x and y . $y = \frac{12}{x}$ or $xy = 12$
(2) The value of x when $y = 6$. 2

4

☒ a If the point $(2, 5)$ is located on the straight line represented to the function $f : R \rightarrow R$ where $f(x) = kx + 3$. Find the value of k and Find the point of intersection of the straight line by the x -axis $(-3, 0)$

☒ b Represent graphically the curve of the function f where : $f(x) = x^2 + 2x + 1$ taking $x \in [-4, 2]$ and from the graph deduce:

- (1) The vertex of the curve . $(-1, 0)$
(2) The maximum or minimum value of the function. 0
(3) The equation of the line of symmetry. $x = -1$

5

☒ a If b is the middle proportional between a and c , prove that $\frac{a-b}{a-c} = \frac{b}{b+c}$. $\frac{m}{m}$

☒ b Calculate the standard deviation for the values : 16 , 32 , 5 , 20 , 27 .

$\bar{x} = 20$ $\sigma = 9.314$

انتهت الأسئلة " مع أطيب التحيات بالتوفيق "



Giza Governorate
The Educational Directorate
The Completion of Basic Education Certificate Exam
First Term 2017/ 2018

جبر ٤ - ع - الفصل الأول



Algebra and statistics

⌚ Time : 2 Hours

Answer the following questions

First question \Rightarrow Choose the correct answer:

- ① If $x = 3$, $y = 5$ then find the value of $y^x = \dots\dots\dots$
a) 15 b) 243 c) 125 d) 8
- ② The range of the set of the values 45 , 75 , 65 , 95 , 35 , 55 equals
a) 30 b) 40 c) 50 d) 60
- ③ The value of $(\sqrt{5} - 3)(\sqrt{5} + 3) = \dots\dots\dots$
a) -4 b) 4 c) 2 d) 8
- ④ If y varies inversely with x then
a) $y = x$ b) $y = mx$ c) $x = my$ d) $y = \frac{m}{x}$
- ⑤ If the radius of a sphere 3 cm then its volume = cm^3
a) 4π b) 36π c) 36 d) 27π
- ⑥ If the point $(a - b, 5)$ is located on the Y-axis then
a) $a = b$ b) $a + b = 0$ c) $a \neq b$ d) $a - b = 5$

Second question \Downarrow

A) If $(x - 2, 3) = (5, 3y + 1)$ then find the value of x, y .

B) If $a \propto b$ and $a = 3$ when $b = 2$ Find:

1) The relation between a, b .

2) The value of a when $b = \frac{2}{3}$

Third question ↓

A) If $X = \{3, -2\}$, $Y = \{1, -4, 5\}$ find:

$$\frac{3 + 2 + 5}{9}$$

1) The cartesian product $X \times Y$.

2) Represent the cartesian product by a cartesian diagram.

B) If $\frac{a}{2} = \frac{b}{3} = \frac{c}{4} = \frac{3a - 2b + 5c}{5x}$ find the value of x .

Fourth question ↓

A) If $X = \{1, -2, 3\}$, $Y = \{-8, -2, 2, 8\}$ and R is a relation from X to Y where $a R b$ means " $b = 2a - 4$ ", for each $a \in X$, $b \in Y$ then:

First: Represent an arrow diagram of R .

Second: Show that why R is a function from X to Y .

Third: If $a R 8$ then find a .

B) If $5a = 3b$ then find the value of $\frac{7a + 9b}{4a + 2b}$

Fifth question ↓

A) The following frequency distribution shows the ages of 10 children

Ages in year	5	8	9	10	12	Total
No. of children	1	2	3	3	1	10

Calculate the standard deviation to ages in years.

B) Represent graphically the quadratic function f where:

$$f(x) = x^2 - 4x + 3, \quad x \in \mathbb{R} \quad \text{where } x \in [-1, 5]$$

then find: 1) The equation of the symmetry axis.

2) The minimum value of the function.



**CERTIFICATE OF
COMPLETION OF THE STUDY
OF THE BASIC EDUCATION
STAGE
THE THIRD YEAR PREPARATORY**

The Directorate of Education

First term - Jan. 2018

subject: algebra & statistics

الجبر والإحصاء
(مترجم إلى الإنجليزية)

Time : 2 hours

Answer all questions

Calculator is permitted

Questions in two pages

Q(1):

A : choose the correct answer from those given:

1- If $x = \{1, 3, 5\}$: R is a function on X :

$R = \{(A, 3); (B, 1); (1, 5)\}$ then $A+B =$ _____

A) 4 B) 6 C) 8 D) 2

2- If $(L - 3, 2)$ lies in first quadrant, then L may be equal _____

A) $\frac{1}{2}$ B) 2 C) 7 D) 0

3- If $2A = 3B$, then $\frac{A}{B} =$ _____

A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) $\frac{9}{4}$ D) $\frac{4}{9}$

B) If $X^2 Y^2 - 4XY = -4$, prove that : x varies inversely as y .

Q(2):

A) Choose the correct answer from those given :

1- The simplest dispersion measurements is _____

[The arithmetic mean or The Standard deviation or The median or The range] 0

2- If $(a; 2) \in$ straight line $Y = 3X - 4$, then, $a =$ _____

[2 or 3 or 4 or 7]

3- If $n(X) = 2$, $n(X \times Y) = 8$, then $n(Y^2) =$ _____

[4 or 2 or 16 or 8]

B) Which number added to terms of ratio 7 : 12 to become 2 : 3 ?

CONT.

**CERTIFICATE OF COMPLETION OF THE STUDY
OF THE BASIC EDUCATION STAGE
THE THIRD PREPARATORY**

JAN. 2018 - Algebra & statistics

THE SECOND PAGE

Q(3):

A) Find standard deviation for values 2, 5, 6, 8, 9.

B) The straight line which represent $F : R \rightarrow R$, where

$F(x) = 3x + a$ cut y-axis at point $(b, 7)$.

Find the value of : $2a - 5b$.

Q(4):

A) If : $\frac{A}{4} = \frac{B}{5} = \frac{C}{3}$, Prove that : $\frac{A+B+C}{A+B+C} = \frac{1}{3}$.

B) If $X = \{1, 2\}$; $Y = \{0, 2, 3\}$ R is A relation from $X \rightarrow Y$ such that aRb means " $a + b = \text{prime number}$ " for each $a \in X$; $b \in Y$, write R , represent it by arrow diagram, is R function ? or not ?

Q(5):

A) If $(3 - x, y + 2) = (-4; 4)$, find the value of $\sqrt{x+y}$.

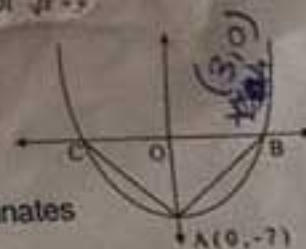
B) The opposite figure represent function

$F(x) = Lx^2 - 7$, the area of triangle

$\Delta ABC = 21 \text{ cm}^2$, $A(0, -7)$ find coordinates

of point B then find the value of L .

The end of questions



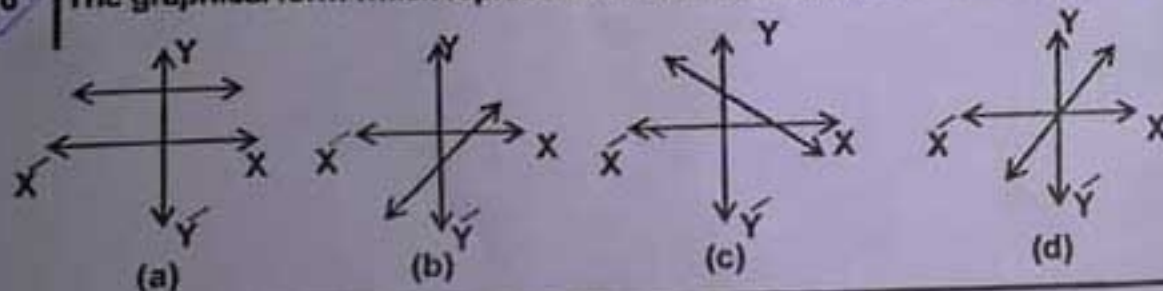


(Calculator is allowed)

Answer the following questions:-

Question (1) : Choose the correct answer from those given:

- 1 If : $n(X) = 3$ and $n(X \times Y) = 12$, then $n(Y) = \dots\dots\dots$
(a) 4 (b) 9 (c) 15 (d) 36
- 2 The arithmetic mean of the set of values : 2 , 3 , 4 , 6 , 10 is.....
(a) 4 (b) 5 (c) 8 (d) 25
- 3 If the point (5, b - 7) lies on X- axis , then b =.....
(a) -2 (b) 2 (c) 7 (d) 12
- 4 If : $f(x) = 3$, then $f(-5) - f(5) = \dots\dots\dots$
(a) 6 (b) 1 (c) zero (d) -1
- 5 If : a , 3 , b , 5 are proportional quantities, then $\frac{a}{b} = \dots\dots\dots$
(a) $\frac{3}{5}$ (b) $\frac{5}{3}$ (c) 2 (d) 8
- 6 The graphical form which represents the direct variation between X and Y is : ...



Question (2) :

- a If : $(x^5, y - 1) = (32, \sqrt[3]{27})$, then find :
The value of each x and y

(بقية الأسئلة في الصفحة المقابلة)

- b If $X = \{1, 2, 3\}$, $Y = \{12, 47, 53\}$ and R is a relation from X to Y where aRb means "a is a digit from the digits of b" for all $a \in X, b \in Y$.

- (1) Write the relation R and represent it by an arrow diagram.
- (2) Show that R is a function from X to Y then find its range.

Question (3) :

- a If : $\frac{a}{2} = \frac{b}{5} = \frac{c}{7}$, then prove that $\frac{5b - 3c}{2c - 3a} = \frac{1}{2}$

- b Graph the curve of function f, where $f(x) = x^2 - 2x$ in the interval $[-2, 4]$, from The graph determine :
(1) The minimum value of the function.
(2) The equation of the axis of symmetry of the curve .

Question (4) :

- a If b is the middle proportional between a and c, then :
prove that : $\frac{a^2 + b^2}{b^2} = \frac{b^2 + c^2}{c^2}$
- b If the point (a, 3) lies on the straight line which represents the function $f(x) = 4x - 5$, then find the value of a .

Question (5) :

- a If y varies directly as x and $y = 6$ as $x = 2$ find :
The relation between x and y, then find The value of y when $x = \frac{1}{3}$
- b The following tables shows the distribution of ages of 10 children in years :

The age in years	5	8	9	10	12	Total
Number of children	1	2	3	3	1	10

Find the standard deviation of the ages in years.

(انتهت الأسئلة)